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PROCEEDINGS

OF THE

AMERICAN PHARMACEUTICAL ASSOCIATION

AT THE

EIGHTH ANNUAL MEETING,

HELD IN

BOSTON, MASS., SEPTEMBER, 1859,

WITH THE

CONSTITUTION AND ROLL OF MEMBERS.

BOSTON:
PRESS OF GEO. C. RAND & AVERY, 3 CORNHILL.
1859.

144,040

OFFICERS OF THE ASSOCIATION.

1859-60.

PRESIDENT.

SAMUEL M. COLCORD, . . . Boston, Mass.

VICE-PRESIDENTS.

1st. WILLIAM PROCTER, Jr., ... Philadelphia, Pa.
2d. JOSEPH ROBERTS, ... Baltimore, Md.
3d. EDWIN O. GALE, ... Chicago, Ill.

TREASURER.

ASHEL BOYDEN, ... Boston, Mass.

RECORDING SECRETARY.

CHARLES BULLOCK, ... Philadelphia, Pa.

CORRESPONDING SECRETARY.

WILLIAM HEGEMAN, ... New York City.

EXECUTIVE COMMITTEE.

CHARLES T. CARNEY, Boston, *Chairman.*

CHARLES A. TUFTS, ... Dover, N. H.
S. S. GARRIGUES, ... Philadelphia, Pa.
GEORGE W. BERRIAN, Jr., ... New York City.
CHARLES BULLOCK, ... Philadelphia, Pa.

COMMITTEE ON THE PROGRESS OF PHARMACY.

EDWARD PARRISH, Philadelphia, Pa., *Chairman.*

ALPHEUS P. SHARP, ... Baltimore, Md.
EUGENE L. MASSOT, ... St. Louis, Mo.
JAMES N. CALLAN, ... Washington, D. C.
WILLIAM HEGEMAN, ... New York City.

LIST OF OFFICERS OF THE ASSOCIATION,

SINCE ITS ORGANIZATION.

PRESIDENTS.

Daniel B. Smith,	Philadelphia,	1852–53
William A Brewer,	Boston,	1853–54
William B. Chapman,	Cincinnati,	1854–55
John Meakim,	New York,	1855–56
George W. Andrews,	Baltimore,	1856–57
Charles Ellis,	Philadelphia,	1857–58
John L. Kidwell,	Georgetown,	1858–59
Samuel W. Colcord,	Boston,	1859–60

FIRST VICE PRESIDENTS.

George W. Andrews,	Baltimore,	1852–53
George D. Coggeshall,	New York,	1853–54
Henry T. Cummings,	Portland,	1854–55
C. B. Guthrie,	Memphis,	1855–56
John L. Kidwell,	Washington, D. C.,	1856–57
James Cooke,	Fredericksburg,	1857–58
Edward R. Squibb,	Brooklyn, N. Y.,	1858–59
William Procter, Jr.,	Philadelphia,	1859–60

SECOND VICE PRESIDENTS.

Samuel M. Colcord,	Boston,	1852–53
Alexander Duval,	Richmond,	1853–54
John Meakim,	New York,	1854–55
Charles Ellis,	Philadelphia,	1855–56
Frederick Stearns,	Detroit,	1856–57
S. P. Peck,	Bennington, Vt.,	1857–58
James O'Gallagher,	St. Louis,	1858–59
Joseph Roberts,	Baltimore,	1859–60

THIRD VICE PRESIDENTS.

C. Augustus Smith,	Cincinnati,	1852–53
C. B. Guthrie,	Memphis,	1853–54
Joseph Laidley,	Richmond,	1854–55
H. F. Fish,	Waterbury, Ct.,	1855–56
H. T. Kiersted,	New York,	1856–57
A. E. Richards,	Plaquemine, La.,	1857–58
R. Battey,	Rome, Ga.,	1858–59
Edwin O. Gale,	Chicago,	1859–60

RECORDING SECRETARIES.

Geo. D. Coggeshall,	1852–53	W. J. M Gordon,	1855–58
Edward Parrish,	1853–54	Charles Bullock,	1859–60
Edw. S. Wayne,	1854–55		

CORRESPONDING SECRETARIES.

Wm. Procter, Jr,	1852–53	Edw. Parrish,	1857–58
Wm. B. Chapman,	1853–54	Ambrose Smith,	1858–59
Wm. Procter, Jr.,	1854–57	William Hegeman,	1859–60

TREASURERS.

Alfred B. Taylor,	1852–54	S. M. Colcord,	1857–59
S. M. Colcord,	1854–56	Ashel Boyden,	1859–60
J. S. Aspinwall,	1856–57		

LIST OF COMMITTEES

TO REPORT AT THE ANNUAL MEETING TO BE HELD IN NEW YORK, SEPTEMBER, 1860.

EXECUTIVE COMMITTEE.

Charles T. Carney, Chairman,	Boston, Mass.
Charles A. Tufts,	Dover, N. H.
S. S. Garrigues,	Philadelphia, Pa.
George W. Berrian, Jr.,	New York City.
Charles Bullock,	Philadelphia, Pa.

COMMITTEE ON THE PROGRESS OF PHARMACY.

Edward Parrish, Chairman,	Philadelphia, Pa.
Alpheus P. Sharp,	Baltimore, Md.
Eugene L. Massot,	St. Louis, Mo.
James N. Callan,	Washington, D. C.
William Hegeman,	New York City.

COMMITTEE ON HOME ADULTERATIONS.

Charles T. Carney, Chairman,	Boston, Mass.
Israel J. Grahame,	Baltimore, Md.
Charles Bullock,	Philadelphia, Pa.
A. P. Sharp,	Baltimore, Md.
E. R. Squibb,	Brooklyn, N. Y.
E. S. Wayne,	Cincinnati, O.

COMMITTEE ON ACT OF INCORPORATION.

Edward H. Rollins, Chairman,	Concord, N. H.
James N. Callan,	Washington, D. C.
William A. Brewer,	Boston, Mass.
John L. Kidwell,	Washington, D. C.
Henry T. Kiersted,	New York City.
F. S. Walsh,	Washington, D. C.
Edward R. Squibb,	Brooklyn, N. Y.
R. H. Stabler,	Alexandria, Va.

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PREFATORY NOTE.

TO THE MEMBERS, BY THE EXECUTIVE COMMITTEE:

The Executive Committee ask for the special attention of every pharmaceutist, who has the good and welfare of our Association at heart, to the few remarks which follow, in which they feel that they address each member of our Association personally.

With this brief introduction, the Executive Committee of the American Pharmaceutical Association take pleasure in presenting herewith the Report of Proceedings of our Annual Meeting for 1859. We feel that the Association has reason to be proud of these annual publications; and we think that in real worth and valuable contributions to science and pharmacy, this volume may be safely and favorably compared with any that have preceded it.

It is now about three months since the meeting of which this volume is the Report; and your Committee feel that it is due to themselves, as well as to the Association, to show why the delay of publication has been so great.

Your Committee made full and complete arrangements for the publication of this volume as soon as they were appointed and authorized so to do. It was agreed to be published and delivered to the members within four weeks of the close of the session; and it would have been so delivered, had not circumstances entirely beyond the control of the Committee prevented.

Some of these preventing causes can be removed entirely; and your Committee beg indulgence if they speak plainly of a matter which is somewhat of importance to us all. We should have our report of proceedings ready for delivery within a month after close of session; while the meeting is fresh in the memories of those who attend, and while those prevented from being present are looking for the Report with interest and anticipation. This can be done, and we trust the Committee who succeed us may have the pleasure of presenting the next annual report at a far earlier period than we have been able to.

The reasons of our delay are simply these. The manuscripts for publication were not all received by us, so as to be given to the printers, for many weeks after the close of the session. The last manuscript could not be given to the printers until November 28th. Can you wonder at the delay?

The delay has not been all, however; it has imposed upon your Committee extra arduous duties in writing and urging forward the manuscripts.

The publication of a volume like this, necessarily imposes upon your Committee an amount of labor which has always been cheerfully and freely given, but as the increase of our Association, and the consequent enlargement of our Reports go on, it will be a matter of so much importance that we can hardly expect to find among our members those who are willing to undertake the publication of the Annual Report, unless they are assured beforehand of the completeness of the "copy" in all its details, before being placed in their hands.

Your Committee would respectfully suggest that all manuscripts should be clearly and fairly written, and be left with Executive Committee for publication, and in all practicable cases, the correcting of the proofs be left with the same committee. In this way some delay may be avoided, owing to sending proofs oftentimes to a distance, delays of mail, etc., unavoidably occurring.

Your Committee feel that it is very important a paper should be printed correctly, for the author's reputation; and they also feel, as every executive committee doubtless would feel, that it is also important that all be correct for their own reputation.

As to the manuscripts, your Committee would respectfully suggest that a resolve be passed at an early day of our next session to this effect:

Resolved, That the Executive Committee receive from the hands of the Secretary, on the last day of the session, all papers and manuscripts, with the minutes of the meeting, referred to them for publication: said manuscripts to be fairly and legibly written, and in proper state to be given to the printers; all manuscripts and papers not so delivered to be excluded from the printed Report, unless delay be granted by a special vote of the Association.

The passage of this resolve, your Committee feel confident, will materially aid their successors in discharging their duties.

As regards the size of the present volume. The amount of matter which is contained in this volume, if printed in same manner as reports of previous years, would make a volume of one thousand pages, and a corresponding increase of cost. Your Committee have taken the liberty of condensing the matter very much, as will be seen, in size of type; thus reducing the cost of publication below what they found, from the amount of matter referred to them, it must of necessity be. We thought we should be obliged to call upon the members for a subscription to defray the expenses of publication, but disliking to establish a precedent in this way — for our Association should be a self-sustaining one — we took the course of reducing expense by diminishing the size of book. We are happy to announce to the Association, that all the expenses will most probably be met very readily, if those members who may be in arrears will send the amount due to the Treasurer, Mr. Ashel Boyden, Boston.

The Treasurer makes an earnest appeal to all who may be in arrears, to forward at once their dues, and thus furnish the funds to pay for printing

these proceedings. Any moneys sent to either the President, Mr. S. M. Colcord, or Chairman of Executive Committee, will be at once handed to the Treasurer, and his receipt for same returned.

No assessment will be made until the result of this call is known, or at least for thirty days after the publication of this volume.

We would much prefer that each year should pay for its own Proceedings and we suggest to each member the plan of ordering as many copies of the present and past volumes as they can dispose of within this month; with the impression that by the adoption of this plan we shall thus be placed at once in funds, without making any call for assistance.

Those members who may not have procured certificates of membership can have them by addressing either the President, Treasurer, or Chairman Executive Committee. The name to be inserted should be plainly written, with full directions for delivery of certificate accompanying it. It is hoped that very many will send their order for a certificate, thus helping our common treasury, and at the same time furnishing themselves with a badge which can be prominently shown and will identify them as members of the American Pharm. Association.

The reports of proceedings for past years, all that are now in print, may be had by applying to the President, Treasurer, or Chairman Exec. Committee. It is hoped that many may avail themselves of the opportunity of procuring the back numbers, which each year become more scarce.

We would call special attention to the Patent Office Reports, pp. 385–397.

The valuable character of these reports will at once strike every member; and at the same time they may be considered complimentary to our Association, evincing the interest felt in us by our national gevernment. We trust we may continue to receive assistance from the same source. What disposition was made of the rare and valuable plants which accompanied the government papers, may be found in the Minutes.

The Committee on Act of Incorporation has been organized, and we presume our petition may be already before Congress. We bespeak for this object, that which we know will be given, the personal aid and hearty support of each of our members, with their delegates in Congress.

It is possible that some errors in the names of members in the roll may have occurred. The greatest care has been used, and as far as possible the correct spelling has been ascertained. We shall esteem it a kindness if all who notice any error of this kind will notify the Treasurer, that the corrections may be made on his books.

An edition of one thousand copies of the proceedings have been printed, each copy bound in boards. One will be sent to each member. The price of the volume will be one dollar, postage twenty-five cents; and it is hoped that the members will promote the sale of the work, and thus increase the income of the Association.

Trusting that what has been done may receive the approbation of the Association, and that all remarks, hints, and suggestions may be received as they are given, freely, kindly, and plainly, as become brethren in pharmacy,

We remain,

Your ob't servants.

CHARLES T. CARNEY,
CHARLES A. TUFTS,
S. S. GARRIGUES,
GEORGE W. BERRIAN, JR.,
CHARLES BULLOCK.

MINUTES

OF THE

EIGHTH ANNUAL MEETING.

THE American Pharmaceutical Association commenced its Eighth Annual Meeting, at the Hall of the Massachusetts College of Pharmacy, Boston, on Tuesday, Sept. 13th, 1859, at 3 o'clock, P. M.

In the absence of the President, the meeting was called to order by Vice-President Robert Battey, of Rome, Ga. The Secretary being absent, Alfred B. Taylor, of Philadelphia, was appointed to act as Secretary, *pro tem.*

The President appointed Messrs. John Meakim, of New York, James S. Melvin, of Boston, and Israel J. Grahame, of Baltimore, a Committee on Credentials, who, after a short recess, reported the following delegates duly appointed to attend the present meeting:—

From the Massachusetts College of Pharmacy.

Thomas Restieaux, Boston, William Brown, Boston,
Geo. W. Parmenter, " Chas. H. Price, Salem,
Eben Blatchford, Rockport.

From the New York College of Pharmacy.

Henry T. Kiersted, Isaac Coddington,
William Hegeman, Geo. Thurber, and
George W. Berrian, Jr.

From the Philadelphia College of Pharmacy.

Wilson H. Pile, Daniel S. Jones,
Charles Ellis, Sam'l S. Bunting, and
Charles Bullock.

From the Maryland College of Pharmacy.

James Balmer, Joseph Roberts,
N. H. Jennings, A. P. Sharpe, and
I. J. Grahame.

From the Cincinnati College of Pharmacy.

Wm. S. Merrill, E. S. Wayne,
W. J. M. Gordon, J. C. Parr, and
Wm. B. Homer.

From the St. Louis Pharmaceutical Association.

Enno Sander, William H. Dornin,
James O'Gallagher, Sam'l D. Hendel, and
Wm. B. Parker.

From the Pharmaceutical Association of Washington, D. C.

Joseph W. Nairn, James N. Callan,
Samuel B. Waite, Joseph B. Moore, and
John Schwartz.

The Executive Committee reported the names of the following persons as having been elected members of the Association since its last annual meeting:—

M. S. McConville, Worcester, Mass.
Raymond Gravesend, New York City.
L. Leroy, " "
Henry Steele, " "
William Wright, Jr. " "
James H. Anderson, " "
P. Wendover Bedford, " "
Alfred J. Shipley, " "
James T. King, Middletown, N. Y.
J. Hartly Bunn, Lynchburg, Va.
R. H. Land, Newberry C. H., S. C.
J. F. Grossklaus, Navarre, Ohio.
C. F. Gove Collins, Beloit, Wis.
Louis D. Lanszweert, San Francisco, Cal.
Charles Hodge, " "
George S. Dickey, " "
George E. Hinckley, " "
Albert L. Calder, Providence, R. I.

The Executive Committee reported the names of the following persons as recommended for membership:—

Thomas A. Lancaster, Adolphus F. Neynaber, Adam H. Wilson, Philadelphia, Penn.; Lewis T. Sillyman, Columbia, S. C.; J. Henry Zeilen, Macon, Ga.; Harry C. Morris, W. Sherman Potts, St. Paul; John W. Shedden, W. Neergaard, New York; M. M. De Levis, Chicago; Charles Pefferman, Peru, Ind.; W. J. Luck, Vincennes, Ind.; W. F. Clency, Cincinnati; John G. Cook, Lewiston, Me.; E. T. Miller, York, Penn.; J. T. Barnett, Danville, Ky.; James Stratton, Bordentown, N. J.; Henry Q. Mack, New York City; W. H. Warner, J. B. W. Nowlin, Rome, Ga.; J. A. Taylor, W. A. Lansdell, Robert J. Massey, B. M. Smith, Atlanta, Ga.; Daniel F. White, Charlestown, Mass.; Fleming G. Grieve, Milledgeville, Ga.; James L. Burbank, Worcester; Joseph Haven Thacher, Portsmouth, N. H.; Leopold Babo, Boston; Charles E. Hinckley, Wm. H. Keith, James G. Steele, San Francisco; John C. Howe, Boston; Ed. G. Frothingham, Jr., Haverhill, Mass.; H. M. Whitney, Lawrence; Chancey L. Case, Brandon, Vt.; Nelson B. Scott, Worcester, Mass.; N. S. Harlow, Bangor, Me.; Levi G. Dodge, Boston; Franklin K. Phillips, East Boston; A. G. Weeks, Wm. J. Cutler, E. Waldo Cutler, B. F. Brown, Wm. D. Miller, Boston; Walter F. Phillips, Portland, Me.; A. R. Bayley, Cambridgeport; Theodore S. Harris, Geo. H. Chapman, Boston; B. K. Bliss, Springfield; Nathan Dikeman, Jr., Waterbury, Conn.; John French, Boston; James Morgan, Concord, N. H.; L. L. Dutcher, St. Albans, Vt.; Theodore Wheeler, Boston; Edmund Dana, Jr., Portland; C. C. Bixby, North Bridgewater; Orlando Tompkins, Boston; Warren Tapley, Lynn; A. H. Ramsey, Cambridge, Mass.; Isaac T. Campbell, South Boston; Thomas Doliber, Charles Clarke, John T. Brown, Boston; Geo. M. Washburn, Chicago, Ill.; Thomas A. Sweetser, South Danvers; Julius Cone, John F. Rollins, Concord, N. H.; Frederick Dutcher, St. Albans, Vt.; John B. Arnold, Fitchburg; Geo. A. Kimball, Haverhill; Michael H. Gleeson, Boston; George Moore, Great Falls, N. H.; Wm. Baker, Brunswick, Me.; Edw. H. Rollins, Concord; Chas. E. Field, Chelsea; E. A. Morse, Rutland, Vt.; Francis O. Bigelow, Medford, Mass.

A ballot was ordered. The President appointed Mr. Edward Parrish, Mr. Henry W. Lincoln, and Mr. John Meakim as tellers, who, after balloting, declared that all of these gentlemen had been elected.

The Executive Committee reported that they had some other names to present to the Association for membership, about whose eligibility they had had some doubts.

It was explained that these parties were not eligible under the Constitution, although they were worthy men, some of them chemists and dealers in eclectic medicines.

Mr. Brewer, of Boston, moved to refer these names again to the Executive Committee.

Mr. Edward Parrish, of Philadelphia, thought dealers in eclectic medicines were, or should be, eligible as pharmaceutists.

The Chairman remarked that this was a matter of much importance, and demands careful attention.

Mr Parrish said he was opposed to letting in quacks; but chemists and many other useful men of practical knowledge were kept out by the Constitution.

Henry T. Cummings, of Portland, Me., was in favor of admitting all persons properly advanced in pharmacy; but the selection from chemists, etc., should be as careful as possible.

Mr. Charles Ellis, of Philadelphia, thought the rules should be altered before admitting a new class of men to the Association.

Mr. Thomas Hollis, of Boston, thought the Association would be strengthened by the addition of scientific men.

Mr. Wm. Procter, Jr., of Philadelphia, thought something should be done to relieve the Committee of unpleasant responsibility.

The motion to refer these names back to the Executive Committee then prevailed.

Mr. Colcord, of Boston, wished to know whether the Association had a right to inquire into the character and standing of delegates from the local societies.

Mr. Parrish, of Philadelphia, thought the Convention had no right to inquire the standing or occupation of delegates.

Mr. Colcord, of Boston, wished to know if the Association had a right to inquire whether delegates claiming membership by virtue of their credentials were eligible under the rules of the Constitution, or whether they must be received solely on their credentials.

Mr. Parrish, of Philadelphia, thought the Association had no right to inquire the standing or occupation of delegates.

The roll of members in attendance was then called, and the following persons were marked present:—

Robert Battey, Rome, Ga.
Chas. Ellis, Philadelphia.
Wm. Procter, Jr., "
Edward Parrish, "
Daniel Henchman, Boston.
Thomas Hollis, "
John Meakim, New York.
Wm. A. Brewer, Boston.
S. M. Colcord, "
Charles T. Carney, "
Charles A. Tufts, Dover.
A. P. Sharp, Baltimore.
Jos. Roberts, "
Jas. Balmer, "
H. T. Cummings, Portland, Me.
S. R. Philbrick, "
Jas. Emerton, Salem, Mass.
A. P. Melzar, Boston.
John Buck, Chelsea, Mass.
Henry Haviland, New York.
George W. Berrian, Jr., "
Chas. H. Lyon, Jr., Boston.
Ashel Boyden, "
Chas. Bullock, Philadelphia.
Jas. N. Callan, Minnesota.
M. H. Gleeson, Boston.
Geo. D. Towne, "
John G. Cooke, Lewiston, Me.
George Thurber, New York.
William Hegeman, New York.
Geo. W. De La Vergne, N. Y.
Henry W. Lincoln, Boston.
David Scott, Worcester.
Ambrose Smith, Philadelphia.
Wilson H. Pile, "
Daniel S. Jones, "
A. B. Taylor, "
O. G. Dort, Keene, N. H.
H. T. Kiersted, New York.
S. S. Bunting, Philadelphia.
E. G. Frothingham, Jr., Haverhill, Mass.
Isaac Coddington, New York.
John D. Dix, "
J. Stratton, Bordentown, N. J.
J. T. King, Middletown, N. Y.
Henry D. Fowle, Boston.
James Gordon, "
Granville M. Clark, "
James S. Melvin, "
Fleming G. Grieve, Milledgeville, Ga.
S. S. Garrigues, Philadelphia.
Israel J. Grahame, Baltimore.
Theodore S. Harris, Boston.
Geo. H. Chapman, "
Leander Neal, Lancaster, Pa.

Total, fifty-five members.

On motion of Mr. Colcord, Mr. Crook was employed by the Association as a reporter — to report the proceedings of the body for the use of the Recording Secretary.

Tickets of admission to the Boston Museum, during the session, were presented to the Association by the Hon. Moses Kimball. The tickets were accepted, and a vote of thanks passed to Mr. Kimball.

A communication was read from Nath'l B. Shurtleff, M. D., on behalf of the Trustees of the Massachusetts State Library, inviting the guests of the Mass. College of Pharmacy to visit the State Library at the State House.

A communication was read from Hon. Emory Washburn, on behalf of the Standing Committee of the Massachusetts Historical Society, to visit the rooms of the Society.

A communication was read from Hon. John P. Bigelow, on behalf of the Trustees of the Public City Library, inviting the Members of the Association to visit and avail themselves of the privileges of the Library during their session in this city.

On motion these invitations were accepted, and the thanks of the Association were voted to each of these bodies.

A letter from Mr. Eugene L. Massot, President of the St. Louis Pharmaceutical Association, on behalf of that body, was read, inviting this Association to hold its next annual meeting in 1860, in St. Louis.

A letter from Mr. Kidwell, President of the Association, was read, regretting his inability to attend the meeting of the Association, also stating that he had sent to the Association several plants presented by Mr. Brown, of the Agricultural Department of the Patent Office, as also his Report from the Agricultural Department and the Indian Office, and requesting that he might be continued on the Committee to confer with those Departments.

A letter was read from Mr. E. Ringk, Vice President of the Swiss Apothecaries Association, acknowledging the receipt of the Proceedings of the Association, and desiring to exchange

the Swiss Pharmaceutical plants for the North American officinal plants; also expressing the hope that kindly relations and intercourse might continue between the two associations.

The Reports of the Standing and Special Committees being called for, the following Reports were presented, read by title, and laid upon the table for further consideration:

Report on the Progress of Pharmacy.

Report from the Agricultural Department of the Patent Office, and Report from the Office of Indian Affairs of the Interior Department, accompanied by letters from John L. Kidwell, President of the Association, from the Department of the Interior, and from C. Carson, Indian Agent, Utah, the latter as follows:

UTAH AGENCY, TAOS, N. M., June 15, 1859.

SIR: — Circular from your office, dated April 30th, 1859, I have the honor to acknowledge. The only reply I can make is to send you roots and herbs, stating for what they are used by the Indians. The names are only known to themselves. They are gathered in the mountains. The samples I send you are used by the Jicharilla Apaches. I will send from time to time, such as are brought to me by the Indians. They are found in latitudes 37°, 38° and 39°. Obtained in small quantities, seven hundred miles from navigable streams, the only facility of sending them to market is on pack mules.

I have the honor to be,
Very respectfully,
Your obedient servant,
C. CARSON,
Indian Agent.

Hon. Commissioner Indian Affairs, Washington, D. C.

Report of the Committee on Revision of the Pharmacopœia.

Report on Weights and Measures.

Report on Home Adulterations, with specimens.

The Report of the Executive Committee was presented, read and accepted.

To the American Pharmaceutical Association:—

The Executive Committee have endeavored to fulfil the duties required of them by the Constitution and specially allotted to them by vote of the Association, during the past year as follows:

The volume of proceedings for 1858 was published as early as practicable af-

ter the meeting; much delay having been occasioned by the voluminous character of some of the papers, and especially by the numerous corrections rendered necessary to fit them for publication. The book reached in all 488 pages, and has been generally acknowledged to contain many valuable contributions to pharmaceutical science.

The edition issued was the same as heretofore, and the entire cost of publication was $895, including binding.

Besides the copies distributed gratuitously among the members, to editors, scientific bodies, etc., aconsiderable number were sold through the kindness of S. M. Colcord of Boston, J. Meakim of New York, I. J. Grahame of Baltimore, W. J. M. Gordon of Cincinnati, E. L. Massot of St. Louis, and others. A large portion of the edition still remains, and it would be desirable if members would aid in giving this valuable series of essays a more extended circulation.

There have been twenty-three applications for membership during the recess; of these twenty have been elected by the Executive Committee before reported, and the following are now recommended for election by the Association: J. Henry Zeilen, Macon, Ga.; Fleming G. Grieve, Milledgeville, Ga.

The certificate of membership of the Association has been issued in favor of 50 members elected at the last annual meeting and during the recess.

Owing to the engrossing nature of the publication of the proceedings, the Executive Committee were unable to give very early attention to the application for an act of incorporation which they were directed to make to Congress.

The following petition was, however, drawn up under the advice of a member of the House of Representatives, signed, and forwarded to Congress, where it met the fate of so many similar documents:

To the Honorable Senators and Members of the House of Representatives in Congress assembled.

The petition of the undersigned Officers and Executive Committee of the American Pharmaceutical Association, respectfully represents, that our Association was established in the year 1852 by Druggists, Chemists, and Pharmaceutists, for the following purposes:

1st. To improve and regulate the drug market, by preventing the importation of inferior, adulterated, or deteriorated drugs, and by detecting and exposing home adulterations.

2d. To establish the relations between druggists, pharmaceutists, physicians and the people at large, upon just principles which shall promote the public welfare and tend to mutual strength and advantage.

3d. To promote the science and the art of Pharmacy by diffusing scientific knowledge among apothecaries and druggists, fostering pharmaceutical literature, developing talent, stimulating discovery and invention, and encouraging home production and manufacture in the several departments of the drug business.

4th. To regulate the system of apprenticeship and employment, so as to prevent as far as practicable the evils flowing from deficient training in the responsible duties of preparing, dispensing, and selling medicines.

5th. To suppress empiricism, and as much as possible to restrict the dispensing and sale of medicines to regularly educated druggists and apothecaries.

This Association already comprises members residing and practising the art of preparing medicine in twenty-seven States. Its meetings are held annually in the principal cities of the Union, having already occurred in Philadelphia, Boston, New York, Cincinnati, Baltimore, and Washington.

In view of the national character of this organization, we desire to extend its influence and permanence by an act of incorporation, and to secure by this means a representation in the Convention of Incorporated Medical and Pharmaceutical Institutions, meeting every ten years for the revision of the Pharmacopœia of the United States.

The undersigned, therefore, respectfully solicit an act of incorporation from your honorable bodies, and will ever pray, &c.

The immense amount of business towards the end of a short session prevented the passage of some of the appropriation bills, and it could hardly be expected that a matter of so little comparative interest as an act of incorporation must have appeared could claim attention, notwithstanding the zealous efforts of our late President, a resident of Washington, to bring it to the attention of the members.

It will be necessary for the Association to decide whether this subject need claim the further attention of our successors.

SAMUEL S. GARRIGUES,
EDWARD PARRISH,
HENRY W. LINCOLN.

The following Committee was appointed by the different delegations, to nominate officers for the ensuing year.

Henry W. Lincoln, from the Massachusetts Delegation.

Wm. Hegeman, from the New York Delegation.

Charles Bullock, from the Philadelphia Delegation.

I. J. Graham, from the Baltimore Delegation.

James N. Callan, from the Washington Delegation.

The following gentlemen were added to the Committee, being appointed by the President from the Association at large: Charles A. Tufts, of New Hampshire; Edward Parrish, of Pennsylvania; and A. P. Sharp, of Baltimore, Md.

On motion, the Association adjourned to meet to-morrow morning at 9 o'clock.

Wednesday Morning, Sept. 14, 1859.

The Association was called to order by Robert Battey, the presiding officer. The Committee on Credentials presented the credentials of Edwin O. Gale from the Chicago Pharmaceutical Association.

A communication was received from Hon. Edward Everett in behalf of the Boston Public Library, acknowledging the receipt of a full set of the published proceedings of the Association since its organization.

The Executive Committee reported the following names for membership.

J. Lyndley Pyle, Brooklyn.
Cyrus Pyle, "
Uriah B. Wilson, Ann Arbor, Michigan.
Samuel P. Duffield, Detroit, "
F. Feist Mayer, New York.
Jos. T. Brown, Boston.
Benj. Proctor, Lynn.
Samuel A. Smith, Newburyport.
Moses D. Colby, Boston.
Geo. Woodbridge, "
R. J. Taylor, Newport, R. I.
Joel S. Orne, Cambridge, Mass.
Francis D. Hardy, Jr., Cambridge, Mass.
William T. S. Cardy, Chelsea.

A ballot was ordered, Messrs. Haviland, Buck, and Bullock acting as tellers, who reported that they all had been unanimously elected.

Notice was given that the Boston Society of Natural History would be open to-day to the public till 5 P. M.

Henry T. Cummings, of Portland, Me., offered the following resolution: —

"That the name or title of the American Pharmaceutical Association shall not be employed by any of the members

thereof upon signs or labels, or in advertisements, in a manner to compromise the Association in respect to its approbation or endorsement of any species of nostrums or proprietary preparation."

This was withdrawn to give place to other business.

The Committee on Nominations reported the following list of officers for the ensuing year, viz.:—

President,

SAMUEL M. COLCORD, - - - - -	Boston, Mass.

Vice-Presidents,

1st. WM. PROCTER, JR., - - -	Philadelphia, Pa.
2d. JOSEPH ROBERTS, - - -	Baltimore, Md.
3d. EDWIN O. GALE, - - - -	Chicago, Ill.

Recording Secretary,

CHARLES BULLOCK, - - - - -	Philadelphia, Pa.

Corresponding Secretary,

WILLIAM HEGEMAN, - - - - -	New York.

Treasurer,

ASHEL BOYDEN, - - - - - -	Boston, Mass.

Executive Committee,

CHARLES T. CARNEY, - - - - -	Boston, Mass.
CHARLES A. TUFTS, - - - - -	Dover, N. H.
S. S. GARRIGUES, - - - - -	Philadelphia, Pa.
GEO. W. BERRIAN, JR., - - - -	New York.
CHARLES BULLOCK, - - - - -	Philadelphia, Pa.

Committee on Progress of Pharmacy,

EDWARD PARRISH, - - - - -	Philadelphia, Pa.
ALPHEUS P. SHARP, - - - - -	Baltimore, Md.
EUGENE L. MASSOT, - - - - -	St. Louis, Mo.
JAMES N. CALLAN, - - - - -	Washington, D.C.
WILLIAM HEGEMAN, - - - - -	New York.

The report was accepted, and a ballot ordered, Messrs. Haviland and Buck acting as tellers. Samuel M. Colcord, of Boston, was declared unanimously elected.

On motion of Edward Parrish, the remaining officers were elected *viva voce*.

Robert Battey, Edward Parrish, and Charles Ellis were appointed to conduct the President elect to the chair.

The acting President, on retiring from the chair, addressed the Association as follows: —

GENTLEMEN: — In the absence of our worthy President, John L. Kidwell, of Georgetown, D. C., as also of the first and second Vice Presidents, it has most unexpectedly devolved upon me to preside over this body till its organization; and in the discharge of this trust I feel called upon to offer you a very meagre and hasty address upon a few of the topics which are to engross your attention at the present sitting of the Association.

I heartily join you, gentlemen, in the embarrassment which we all feel, deprived as we are of the valuable aid which the annual address of our President affords us as a guide to our deliberations. Equally do I sympathize with you in the disappointment which the loss of this usually prominent intellectual feast occasions; and in this connection I would respectfully suggest and urge the importance of our presiding officer preparing this necessary document at a period sufficiently early to insure its safe delivery at the time and place of meeting, in case it shall be impossible for him to attend in person.

Of the progress which the Association has made in the last twelve months, I cannot speak pointedly and authoritatively, and therefore will not speak at all; but simply refer you to the fact that in the organization of the Association in 1857 forty-five members answered to the call of the roll; in 1858, at a similar stage of the proceedings, only twenty-five were found to be present. On yesterday, gentlemen, if I mistake not, you listened to the response of over fifty members upon the call. In addition to this evidence of continued and increasing interest, you will not have failed to observe the very large number of new members admitted by ballot upon the recommendation of the Executive Committee. In the absence of any reflecting mirror upon these walls, at the peril of your modesty and mine, I ask you to look around you for the evidences of character, intellect, and zealous devotion to the common cause dear to all of us, which give hope and confidence to the future. Here and there you will notice the downy lip, with all the anticipation, impetuosity, and vigor of youth. Here also in full force is to be found the more deliberate strength and firmness of manhood. And there stand the fathers in our profession, their locks silvered over with the frosts of many winters, attesting by their presence here to-day that they have joined the zeal of youth to the strength of manhood, and grafted both upon the sturdy stock of experienced and reflecting age. Separated as we are, not by miles, but by thousands of miles, each with an influence more or less extended in the little circle of his chosen home, and yet all united as touching one thing, who shall say that the object

for which we labor will not be accomplished? I cannot doubt, gentlemen, that you will sustain me in the assertion that we have much cause of congratulation in the past, and for earnest effort in the future.

The subject of the participation of this Association as a distinctive body through its appropriate committee of delegates, in the next revision of the Pharmacopœia, is one which has commanded the attention of the body, and the Executive Committee at our last session were instructed to apply for an act of incorporation, with a view to the accomplishment of this end. The report of that committee is upon the table, and will come up before you in due time for deliberation and further action.

You are aware that without this act of incorporation any delegation which we may appoint will not be received into the Pharmacopœial Convention; and it is well also to bear in mind, that *with* the incorporation we are not *necessarily* entitled to such a representation, since our Association, taking its origin subsequently to the last meeting of the revisory convention, is not now recognized by the rules which govern that body. I doubt not, gentlemen, you will feel deeply interested in the matter, and take such action as will distinctively preserve to our body the labors which we may contribute towards the newly revised Pharmacopœia. I commend this whole subject to your mature thought and earnest individual effort.

The question of eligibility of persons for membership in the Association will perhaps come before you. You need not be informed of the language of the Constitution upon this point, nor need I tell you that the Constitution is worded with an object and intention upon the part of its framers, the purity of which will not be called in question, whatever decision we may arrive at as to its wisdom. The question I conceive to be one of moment, one which lies near to the foundation of the superstructure which we have reared, one which it does not become us to act upon hastily or inconsiderately. In it may be involved the perpetuity of the Association upon the one hand, or its more extended usefulness and increased dignity upon the other. There is doubtless much to be gained by the introduction of zealous, enterprising, investigating men, who are manufacturing chemists only, and neither pharmaceutists nor druggists, as required by our Constitution. We may learn much that is new and useful from eclectic pharmaceutists properly so called, and yet it may be pertinently asked, Are we not opening the door of our citadel to a dangerous extent, if we admit them? Now shall we be able to draw the line between the different grades of manufacturing chemists, shading off as they do by insensible gradations until at last science is well-nigh gone and a mere mechanical art remains? Shall we admit the chemist who manufactures drugs in general, and exclude the fabricator of but a few medicinal articles? or, if *he* be admitted, what are we to do with those engaged in paints and dyes, perfumeries and other kindred pursuits? How do we stand with reference to analytical chemists, closely allied to us, with professors of chemistry and materia medica in

our medical schools, botanists, mineralogists, and other men of science pursuing themes of study more or less akin to ours? If we admit the eclectic, how are we to refuse the culler of simples, the Thompsonian, the Homœopathist?

The subject is one which may be oft turned over in the mind, and I trust, gentlemen, you will turn it industriously until you shall have seen its every phase before pronouncing your decision. I will merely throw out the suggestion, that if it be deemed desirable to open wider the door of membership, it might be done by the introduction of a third order of members intermediate between the two already recognized, and to be known as associate members; enjoying, perhaps, all the privileges of the others, excepting the privileges of office-holding, voting, and paying.

In conclusion, gentlemen, allow me to express to you my heartfelt thanks for the honor conferred upon me in my absence at your last meeting, which has accidentally called forth this feeble tribute to our common cause.

The President elect was conducted to the chair, and on taking his seat made the following address: —

GENTLEMEN-ASSOCIATES: — The honor you have conferred by electing me to preside over your deliberations, I accept with reluctance, on the score of my own personal disqualifications, though as a compliment in giving the office to Boston, and as the highest compliment from the Association to me, I value it highly, as reposing confidence in one of your oldest members, who has always been ready to offer his views for what they are worth at a period in your history when there was no precedent to follow and no landmarks to guide, — at a period when a mistake in our organization might have proved fatal to the realization of our hopes.

Happily, those questions of a perplexing character that must necessarily arise and be settled, in the first efforts of our organization, in the general plan of our operations, have been met and settled; and it must be gratifying to you, as to me, that it has been done without jar or discord, — that all have been united in one common object — to promote the advancement of pharmaceutic skill and science throughout the land. To attain this end, we have thrown our doors wide open to welcome all well-wishers to our profession, to unite with us to receive whatever of good we have to impart, and to do what they may for the benefit of our common cause.

How different are the circumstances under which we meet to-day, our eighth anniversary, to what was our first meeting, with but nine members, strangers. An imperative necessity existed for associated effort to regulate and improve our profession. We then met without confidence in ourselves, and under a still greater embarrassment of having no leaders in our labors; strangers by reputation even to our distant brethren, how could we look with confidence to their support in the general apathy which all knew hung like an incubus over all ranks in our line of business.

I have said that an imperative necessity existed for such an organization, and that I can give as the only reason why we exist. All other trades and professions have their organizations for associated efforts, and as it is the general average of varied talent and ideas that make the unit nearest perfection, so we shall find it; every one has a mission to perform as well to his fellow as to himself. There is no one so humble in our ranks but can add something of value to our common stock. Then let us each lay aside excess of modesty as well as ostentation, and join head and heart in the work before us.

It is with these views and with these feelings that I accept the office with which you have honored me — not because I feel that you have made the wisest selection, and grave doubts that you have made a judicious one — but as no one can tell his capabilities until they have made the trial; and relying upon your generous support and kind forbearance, I can only promise my best efforts for facilitating business, as well as for your general comfort and happiness while you remain in Boston.

And I feel sure that while I express myself personally at your disposal, I do but express the sentiments of the Massachusetts College of Pharmacy, as well as the drug trade of Boston.

And I can but hope that you will consider us, individually and collectively, as a committee of the whole, raised for your especial convenience during your sojourn with us — and make use of us accordingly.

After a short recess the Association was called to order.

On motion of Mr. Meakim, of New York, the thanks of the Association were tendered to Robert Battey, for his address, and the able manner in which he had presided, also to A. B. Taylor, Secretary *pro tem.*, for his services.

A resolution was passed to make the report of the Committee on Home Adulterations the first order of business in the afternoon.

The Chair appointed Messrs. Hollis, of Boston, Stratton, of New Jersey, and Bunting of Philadelphia, a Committee to take charge of the various invitations extended to the Association, also to prepare for action, subjects referred to by the retiring President in his address, and other unprepared business laid on the table.

Wm. Procter, Jr., of Philadelphia, Chairman of the Committee on the "Progress of Pharmacy" read extracts from a voluminous report, embracing a view of the discoveries and

improvements in Pharmacy and the sciences; the condition of the schools of Pharmacy in the United States; Pharmaceutical literature, new works issued, and in course of publication on Chemistry, Materia Medica, and Pharmacy; and the condition of the drug market and chemical manufactures. Concluding with obituary notices of men eminent is scientific attainment.

The report was accepted, and referred to the Executive Committee with full powers. (See page 49.)

The subject of the suspension of the publication of Importations of Drugs and Chemicals, was discussed by Messrs. Dix, of New York, Procter, Parrish, and Jones, of Philadelphia, and Stearns, of Mich. It was the sense of the Association that such a publication as had heretofore been made by the sanction, and under the direction of the drug inspector of New York, was beneficial to the interests of commerce. Mr. Dix, thought a proper representation of the subject to the Secretary of the Treasury, by this Association, would probably remove the restriction.

On motion of Wm. Procter, Jr., the subject was referred to a Special Committee, to report at a future meeting such action as may be deemed advisable; to constitute this Committee, the Chair appointed Messrs. Dix of New York, Brewer of Boston, and Procter of Philadelphia.

On motion of Edward Parrish, it was voted that the subject of an act of incorporation for this Association, as referred last year to the Executive Committee, be referred to a Special Committee, with power to use the necessary means to obtain such an act from Congress.

The President believed it was proper to have an act of incorporation, so that the Association can sue and be sued, — so that the Committee on Adulterations can report names without being personally responsible, and power to hold and transfer property legally with other corporate rights and privileges.

Mr. Stratton, of New Jersey, thought if they had an act of

incorporation they would be more likely to receive donations from individuals, or from Congress.

The Chair deferred the appointment of the Committee till the afternoon session.

On motion of Wm. Procter, Jr., the Chair was directed to appoint a Committee of four members to examine the specimens submitted to the Association, and report at a future sitting, — the appointment of this Committee was reserved till the afternoon.

The Executive Committee reported the following names for membership: —

Wm. Atwood, Portland, Maine.
Luther Atwood, Brooklyn, N. Y.
Corydon E. Tyler, New York.
Samuel Noyes, New Haven.
James M. B. McNary, Hartford, Conn.
H. H. Burrington, Providence, R. I.

A ballot was ordered, Messrs. Haviland and Buck acting as tellers, who reported all the above gentlemen duly elected.

On motion of Edward Parrish, it was resolved that an evening session be held that evening, commencing at 7½ o'clock, to be devoted to the reading of papers.

On motion, adjourned, to meet at 3 o'clock, P. M.

Wednesday Afternoon.

The former Treasurer reported verbally: — stating that the expenses of publishing the proceedings for 1858 had all been paid, and a balance of $\$231\frac{31}{100}$ remained in the hands of the Treasurer.

A Committee consisting of Charles Ellis, J. Meakim, and Henry Haviland, were appointed to audit the account of the late Treasurer.

The Executive Committee reported the following names for membership: —

Charles P. Pollard, California.
Samuel Kidder, Jr., Lowell, Mass.
Geo. C. Hunt, Jr., Frederickton, N. B.

A ballot was ordered, Messrs. Haviland and Buck acting as tellers, who reported all the above gentlemen duly elected.

The Committee on Invitations and the President's Address made the following report: —

The Committee appointed "on Invitations and on the President's Address," have attended to their duty, and respectfully report: that invitations have been presented to them to visit the Boston Museum, Mass. State Library, Mass. Historical Society, Public City Library, and Boston Natural History Society. Members wishing to visit any of the above Institutions can be admitted by presenting their copy of the "Pharmaceutists' Guide," and their ticket at the Museum.

The remaining topic for consideration, presented by the President's Address, is the "eligibility of persons for membership."

Your Committee would recommend that Art. ij., Sec. j., of the Constitution, be so amended as to read as follows: —

"Every pharmaceutist, druggist," or chemist, "of good moral and professional standing, whether in business on his own account, retired from business, or employed by another, who, after duly considering the objects of the Association, and the obligations of its Constitution, is willing to subscribe to them, is eligible to membership."

All of which is respectfully submitted.

THOMAS HOLLIS,
JAMES STRATTON,
SAMUEL S. BUNTING, } Committee.

The report was accepted and laid on the table.

Charles T. Carney, of Boston, chairman of the Committee on Home Adulterations, reported at length on this important subject. (See page 245.)

Mr. Carney exhibited numerous specimens of adulterations which had come to the notice of the Committee during the past year, one of which, the falsifications of fecula, was exhibited by Mr. Carney under the microscope, showing some handsome specimens of "Rio Tapioca," to be Potato Starch.

On motion, the report was accepted, and referred to the Executive Committee, with instructions to publish in full.

Mr. Kiersted, of New York City, extended to the Association an invitation from the New York members present, to hold the next annual meeting of the Association in New York city.

A letter was read from John Thompson, of Sumter, S. C., addressed to Charles Ellis, inviting the Association to hold its next meeting in Columbia, S. C.

The attention of the Association being again occupied with the subject of Home and Foreign Adulterations, a number of interesting verbal communications were made on these subjects. The falsification of Tapioca was stated to be carried on very extensively in Liverpool, a New York drug house acting as agents for this country. The peculiarity of the grade of cochineal, known in the market as "London Sifted," was described, its *peculiarity* being due to exhaustion of coloring matter without injuring the texture of the insect, which subsequently is dried and dusted with sulphate of baryta, a process which, while it gives to the insect the *silver gray* color, has the property of somewhat increasing its avoirdupois.

On motion of Edward Parrish, Dr. Charles T. Jackson, of Boston, was invited to take a seat with the Association and participate in its discussions.

Dr. Charles T. Jackson made some remarks about Adulterations that had come within his knowledge. In this vicinity corn meal and bran are used in adulteration, instead of shipbread, as in New York, and bran is substituted for red lead, in the manufacture of red pepper. Corn meal is used in mustard to the extent of from 30 to 50 per cent. The cream of tartar used in making bread, is made up in part of ground rice and alum. Gum tragacanth enters into the composition of opium, and spices and blistering flies are ground in the same mill. At the request of Mr. Brewer, of Boston, he also explained his method of ascertaining when leather was colored by Nicaragua wood instead of cochineal.

Remarks upon this subject were made by several other gentlemen.

Mr. Hollis, of Boston, said corn meal was used in ground cinnamon, and soda ash was sold for saleratus.

Mr. Dix, of New York, said it was within his knowledge that one firm in that city used annually one hundred tons of soda ash in manufacturing saleratus, and other establishments used smaller amounts.

On motion of Wm. Procter, Jr., the thanks of the Association were tendered to Dr. Jackson for his interesting remarks on Adulterations.

A specimen of a new Resin of Scammony, manufactured in England by Messrs. McAndrew & Sons, was laid before the Association by Charles Ellis, of Philadelphia, and some explanatory information concerning its commercial history, and properties, communicated by Messrs. Dix and Squibb, of New York, Procter and Parrish, of Philadelphia, and Fish, of Connecticut.

Mr. Dix said the Messrs. McAndrews had had their attention drawn to the article by finding the plant growing wild among liquorice root, which they cultivated extensively in Asia Minor. The admixture caused them some trouble in the preparation of extract from the liquorice.

Tickets of admission to the Aquarial Gardens in Bromfield St., were presented to the members, through Mr. Harris, of Boston. On motion, the thanks of the Association were tendered to Mr. Cutting, through Mr. Palmer, for the invitation.

The Chair announced the appointment of the following Committee:

ON INCORPORATION.

James N. Callan, Washington, D. C.
E. H. Rollins, Concord, N. H.
W. A. Brewer, Boston.
R. H. Stabler, Alexandria, D. C.
J. L. Kidwell, Washington, D. C.

By vote of the Association the President was authorized to add to, and re-construct this Committee. (See last day's proceedings.)

ON SPECIMENS.

Ambrose Smith, Philadelphia.
Prof. Thurber, New York City.
Prof. Procter, Philadelphia.
A. P. Sharp, Baltimore.

Evening Session.

A Committee consisting of Messrs. Procter, Stearns, Carney, and Grahame, were appointed by the chair to bring forward a list of subjects to be reported on next year.

Subjects referred last year to be reported upon at this meeting being called up, the following papers were read and referred to the Executive Committee:

Query 39. "On Silphium laciniatum, or rosin weed of the western prairies." By Edwin O. Gale, of Chicago. (Page 285.)

Query 2. "On Wine of Ipecacuanha," by Joseph Roberts, of Baltimore. (Page 281.)

Query 3. "On coating pills with sugar, &c.," no answer was received from Mr. Canavan.

Query 40. "On deterioration of pharmaceutical preparations, and the means of preventing it, &c.," by Edward Parrish, of Philadelphia. (Page 309.)

Query 5 On "Southern prickly ash bark," no answer was received from Mr. Merrill.

Query 6. On "the normal solvent power of water, alcohol, and ether, and their admixture," no answer was received from Mr. Thayer.

Query 7. On "the value of iridescence in essential oil of bitter almonds as a test of its purity," no answer was received from Mr. Wiley.

Query 8. On "the tests to determine adulterations of wines and liquors." No answer was received from Mr. Weyman.

Query 9. On "the chrome and magnesia ores of Lancaster county, Penn." A letter was read from Mr. Heintish, stating that the indisposition of Mr. Tyson, who worked the chrome ore, prevented his obtaining satisfactory information. Some valuable beds of magnesia earth are owned by Messrs. Powers and Weightman, of Philadelphia.

Query 10. On "the principles removed from opium by treatment with ether, &c." No answer was received from Mr. Massot.

Query 11. "A synopsis of the history of Pharmacy, and its progress." A paper was received from Mr. O'Gallagher, extracts from which were read by Samuel Garrigues. (Page 290.)

Query 12. The "history and statistics of the production of castor oil in Porto Rico." No answer was received from Mr. Milhau.

Query 13. "The history of the culture, products, and uses of the cocoa nut." A letter was received from Mr. Donnely, and the question was, by his request, continued to him for another year.

Query 14. "On the best form of press and pressing box," by request of E. R. Squibb, this subject, with the following one, (No. 15,) was continued to him for another year. In place of this Query, Dr. Squibb read a paper "on a new machine for the mechanical preparations of mercury," accompanied by a drawing of the machine. Dr. Squibb also remarked on some of the important physical characters of blue mass, and mercury with chalk, and presented specimens of these preparations. (Page 359.)

Mr. Dix, of New York, presented to the members of the Association specimens of the new Scammony resin, as made

by Messrs. McAndrew & Son, desiring that investigation might be instituted to arrive at its real character and worth.

On motion, adjourned to 9 o'clock on Thursday morning.

Thursday Morning.

The minutes of yesterday were read, corrected, and adopted.

Mr. Tufts, of Dover, N. H., informed the Association of the decease, in July last, of Mr. S. P. Peck, of Bennington, Vt., formerly a Vice President of this Association. Mr. Tufts offered the following resolution:—

Resolved, That the American Pharmaceutical Association learn with regret of the decease of S. P. Peck, of Bennington, Vt., formerly a Vice-President of this Association, and feel, that the Association has lost one who was warmly interested in its welfare, and who in all his intercourse with its members, gained their esteem by his courtesy and kindness.

Resolved, That the Association tender to the family of Mr. Peck, their sympathy for the great loss they have sustained.

The resolution was unanimously adopted, and the Secretary directed to furnish the family of Mr. Peck a copy of the same.

Report of the Standing Committees being the order of business, the Executive Committee reported that Bradford Ritter, of Philadelphia, had sent in his resignation; the Committee reported that Mr. Ritter had paid his dues, and returned his Certificate of Membership. On motion of Mr. Garrigues, the resignation of Mr. Ritter was accepted.

The subject of Resignations claiming attention, the following resolution was offered by A. B. Taylor, of Philadelphia, and adopted.

Resolved, That the Treasurer have power to receive the resignation of any member, on the return of his Certificate of Membership, and the payment of his dues in full to the Association.

Alfred B. Taylor, of Philadelphia, chairman of the Committee on Weights and Measures, read abstracts from an able and voluminous report on the subject.

On motion, the report was referred to the Executive Com-

mittee, with instructions to publish it in full in the proceedings of the Association, and also in a separate form. (Page 115.)

On motion, it was resolved, that when we adjourn, we adjourn at 2 P. M., to meet at 3½ o'clock.

Edward Parrish, chairman of the Committee on Revision of the Pharmacopœia, read extracts from a report on that subject. (Page 217.)

During the reading of this report, suggestions and observations were made by several members.

Dr. E. R. Squibb, Mr. Colcord, Mr. Parrish, Prof. Grahame, Mr. Dix, Mr. Meakim, Mr. Tufts, Mr. Ellis and others, spoke of the proper specific gravity of ammonia, the difficulty of keeping it, and the cause of its occasioning explosion.

Some inquiry being made as to what should be done with this report, the Chair suggested that delegates be appointed to the National Convention for the revision of the Pharmacopœia, to present it there.

Mr. Parrish thought it should be sent to that Convention without being printed.

E. R. Squibb believed it should be printed, and believed the Committee of Revision would be glad to avail themselves of it. He was not afraid of the proceedings making too large a volume.

The Chair entertained similar views, and thought by having the report printed, the value of its suggestions would be tested by experiments.

Mr. Carney alluded to the benefit that had been derived from printing of similar reports.

Mr. Meakim thought the report should be published at once in a pamphlet form, and distributed through the country.

After further remarks by Messrs. Procter, Garrigues, and Battey, the report was, on motion of Dr. Squibb, referred to the Executive Committee for publication, with discretion to omit any matter previously published in the proceedings, and to refer by note to such previously published matter.

On motion of Edward Parrish, the subject of the place for holding the next Annual Meeting was taken up.

Dr. Battey proposed Atlanta, Georgia, and advocated a meeting in the South, as a measure calculated to advance the progress of pharmaceutical information and interest in that section.

Mr. Callan advocated St. Louis, Messrs. Coddington, Kierstead, Squibb, Meakim and Procter, New York.

Some arguments were advanced in favor of permanently localizing the meetings.

The Chair was in favor of perpetuating its migratory character, as calculated to enlarge the sphere of usefulness of the Association.

Mr. Fish, of Conn., gave notice, that at a future session he would offer a resolution, permanently locating the meetings of the Association in New York City.

E. R. Squibb moved that when we adjourn, we adjourn to meet in New York.

Mr. Callan, moved an amendment, by substituting St. Louis for New York. The amendment was lost.

Mr. Dix, moved to amend, by substituting Atlanta, Georgia. The amendment was lost.

A motion to adjourn then prevailed.

Afternoon Session.

The Executive Committee presented the following names for election to membership.

James Emerton, Salem, Mass.
William H. Ware, Gloucester, Mass.
James A. Gleeson, Boston, "
Samuel H. Woods, " "
Henry Warren, " "
Rufus W. Stevens, Somersworth, N. H.
Alfred C. Dana, Providence, R. Island.
Benjamin F. Johnson, Philadelphia.
Lewis Dohme, Baltimore.

A ballot was ordered; Messrs. Haviland and Buck, acting as tellers, reported all the above persons duly elected.

Mr. Brewer, from the Committee appointed to coöperate with the Agricultural Department of the Patent Office, in introducing foreign medicinal plants, made the following report for Mr. Kidwell; covering a voluminous correspondence between the Committee and officers connected with the Patent Office: —

That according to instructions the annexed communication was addressed to the Agricultural Department of the Patent Office. The accompanying report from the Department is another evidence of the great interest they feel in our Association. Their entire willingness to coöperate with us gives assurance that any suggestions made by the Association relative to the introduction of other medicinal plants into our country will be cheerfully received.

The Committee also addressed a communication to the Commissioner of Indian Affairs, inviting the coöperation of his department. The annexed circular was matured, as the most certain plan of obtaining the information desired, and was cheerfully printed by the Department and forwarded by the Commissioner to most of the Indian Agents. Although the information is meager, yet it is evidence of the wish of the Department to coöperate with the Association in their endeavors to obtain information in regard to the subjects referred. The Committee are assured that the Commissioner will forward to the Association any information having reference to the inquiries immediately on receipt at this office.

WASHINGTON, D. C., March 12th, 1859.

Agricultural Bureau, Patent Office, Washington, D. C.

SIR: — At a meeting of the "American Pharmaceutical Association" convened in this city, in September last, the undersigned were constituted a Committee and instructed to draw up an application on behalf of the "Association" to your Bureau, for specimens of such medicinal roots, plants, or seeds capable of yielding plants, as may be deemed suitable for experimental culture or analysis, to distribute such in parcels to the Secretaries of the Colleges of Pharmacy at Boston, New York, Philadelphia, Baltimore, Cincinnati, and elsewhere, with a request that these Colleges, &c., should transmit the results of their experiments through this Committee to the "Agricultural Bureau" at as early a day as practicable. In compliance with these instructions the undersigned place the matter before you and respectfully request your coöperation, with any information on the subject that in your opinion may be of interest or importance.

Very Respectfully,

JOHN L. KIDWELL, Georgetown, D. C.
THOMAS P. JAMES, Philadelphia, Penn.
WILLIAM A. BREWER, Boston, Mass.
F. S. WALSH, Washington, D. C.

U. S. PATENT OFFICE, September 10th, 1859.

SIR:—In compliance with the request of a Committee appointed by the American Pharmaceutical Association, made on the 12th of March last, that this Office should furnish specimens of such medicinal roots, cuttings, or seeds capable of yielding plants, as may be deemed suitable for experimental culture or analysis, with any information on the subject that may be considered of importance or interest, herewith I inclose a communication from Mr. D. J. Browne, which will show to what extent your Association may be supplied.

By Adams & Co.'s Express I send you living specimens of the plants named in the accompanying list, all grown since the 1st of May last, from seeds or cuttings in the Propagating Garden connected with this Office.

I have the honor to be,

Very respectfully,

Your obedient servant,

S. T. SHUGERT,

Acting Commissioner.

John L. Kidwell, President American Pharmaceutical Association, Georgetown, D. C.

U. S. PATENT OFFICE, Sept. 10th, 1859.

SIR:—At the request of a Committee appointed by the American Pharmaceutical Association, in September, 1858, herewith I furnish a condensed account of the operations of this Office during the past year, so far as they relate to medicinal plants, and would suggest that said Association, at their next meeting, express some opinion as to the expediency of extending the introduction of such products yielding substances used in Pharmacy as would be likely to admit of profitable culture in any part of the territory of the United States.

Among the objects undertaken by this Bureau which promise to be of moment, first may be mentioned the introduction of the Tea-plant. Towards the close of 1857, the services of Mr. Robert Fortune were secured, and on the 1st of March following, he proceeded from England by the overland route to the tea districts in the north of China, where he remained until April last. During his sojourn in that country, he procured a large quantity of the seeds of the tea-shrub, as well as those of other useful and ornamental plants, packed them in Wardian cases and shipped them to the United States, where they arrived in the course of the past Spring and Summer. In order to secure the safe propagation of these seeds, preparatory to their removal to the sites where the experiments are ultimately to be made, a portion of the public grounds in the City of Washington was set apart, thoroughly underdrained with tiles and two propagating houses erected thereon, each 10½ feet in length, 25 feet wide and 25 feet high, in such positions and on such principles as would afford an in-door climate adapted to their speedy germination and final development. These houses run north and south, so as to receive

the natural effects of light in the morning and evening, but are screened during the middle portions of the day by sections of opaque roof from the intense rays of the sun. Instead of being warmed by fires, hot water, or steam, they are so arranged as to maintain a temperature, degree of moisture, and ventilation during the colder months of the year, suitable for propagating all half hardy trees and plants from seeds or otherwise by means of decomposing vegetable matter, covered with a due proportion of nitrogenous materials. The first of these houses was brought into requisition in January last. In order to generate a suitable temperature, the hot-beds were commenced by filling them to the depth of about a foot with the dried culms and leaves of the Chinese sugar-cane, which were then covered with fresh horse-manure some 10 inches thick. After allowing these materials to ferment for about three weeks, so as to liberate a considerable amount of ammonia and other gases pernicious to vegetation, the house was ready for trial. It was observed that it was free from unpleasant odors, and from the middle of February to the end of May a temperature was usually maintained from 70° to 75° F., sometimes as high as 90°, in the middle of warm, sunny days, but never lower, even at sunrise, than 55°. Waiting for the expected arrival from China, considerable quantities of the seeds of the El Paso grape, Cork oak, and other trees, as well as the cuttings and seeds of several other varieties of grapes and other products, were planted in boxes placed on these beds. With due attention to watering and ventilation, they all speedily germinated, and in a few weeks had grown sufficiently to be transferred into other boxes or pots, and subsequently removed out doors, where they continue vigorous and in a healthy condition. On the arrival of the seeds of the tea shrub, and other Chinese products, brought in the Wardian or glazed cases, at the end of April and subsequently, they were found to be in excellent order, many of them being well germinated and in a fit state for planting. Immediately after sowing in pots and boxes, they were daily watered, at night and morning, with rain water collected from the roofs of the houses, when obtainable, at other times from wells. The young seedlings promptly appeared, after which the waterings were less frequent. They gradually progressed in their growth, and at the present time, it is estimated that there are from 40,000 to 50,000 tea plants, from six inches to two feet in height, and the experiment thus far bids fair to be crowned with success.

The seeds of the Camphor Tree, (*Laurus Camphora*,) and of the Vegetable Wax Tree, (*Rhus Succedanea*,) — the latter from Japan — were somewhat limited in quantity, but the plants are in a fine growing state.

In prosecuting the extension of the grape and wine culture in the United States, several thousand cuttings of the vines of Egypt were obtained and are now flourishing in one of the propagating houses, with the view of hybridizing them with the seedling native grapes growing at present on the adjacent grounds. It is conceived that an important advantage would be gained in propagating the American grapes from seeds, not only by producing improved

varieties, but by fecundating their stigmas with the pollen of the Black Hamburg, Chasselas de Fontainebleau, White Frontignan, White Muscat of Alexandria, or other delicate varieties, the result of which would be a hybrid fruit. These, if cultivated, in most cases would probably produce a grape partaking of the properties of each of the parents, being hardier on the one hand, and of more delicate flavor on the other.

In connection with the wine-culture, large quantities of the acorns of the Cork Tree, (*Quercus suber*,) were obtained, in January last from the south of Spain, most of which have been distributed in portions of our own territory, where it is believed they will thrive. Some of those sown in the propagating house attached to this Office, and subsequently planted out of doors, are now nearly 2½ feet in height, are strong and vigorous, and will be exposed during next winter, with the view of testing their adaptation to the climate.

The Melochia, (*Corchorus Olitorious*,) sometimes called "Mauve de Juif," is a celebrated pot-herb, long cultivated along the Nile and in the East, has succeeded well, and bears marks of maturing its seeds in this latitude. Its tender leaves and stalks abound in mucilage, even more than the capsules of the okra, (*Hibiscus Esculentus*) which renders it highly valuable for soups.

The Wild Camomile, (*Pyrethrum Caucasicum*,) has matured its seeds this season in the open air, and doubtless will serve as a desirable acquisition in furnishing material for the powder so celebrated in the destruction of various insects and vermin.

From the following extracts and correspondence between His Excellency, C. R. Buckalew, Minister Resident at Ecuador, and the Patent Office, it will be seen that measures have been taken to introduce from South America the trees producing the Peruvian Bark. In a recent letter from His Excellency, received by the Honorable Jacob Thompson, Secretary of the Interior, he says, "I inclose the copy of a letter from Sir William J. Hooker, Director of the Royal Botanical Gardens at Kew, addressed to Professor William Jameson, at Quito, relative to the introduction of the *Cinchona*, or Peruvian-bark tree into the East Indies. The Dutch have succeeded already in its introduction into Java, and the present attempt is in continuation of efforts heretofore made by the English. I am able to state, in addition to the contents of this letter, that the gentlemen referred to in it are about being engaged, and the enterprise will go on.

"Cannot steps be taken at once for the introduction of this valuable tree into the United States? It is becoming scarce in the Andes before the depredations of the hunters, and may soon become nearly exterminated. In Southern Ecuador the price has gone up from $40 per hundred to $1 per pound.

"It would doubtless flourish in California, and in many parts of our Southern States."

Letter of Sir William J. Hooker.

ROYAL GARDENS, KEW, May 16th, 1859.

I am greatly in hopes an arrangement will be made to employ Mr. Spruce and another gentleman, (Mr. Markham,) who will be sent out from England in September, in collecting Cinchona plants and seeds, and sending them, on a large scale, to our Indian possessions, as the Dutch have done to Java, where, it is said, they are flourishing.

I have strongly urged upon Lord Stanly and Sir James Weir Hogg, who consult me on behalf of the India Board to employ Mr. Spruce (so thoroughly competent, and now on the spot,) as well as Mr. Markham; and fortunately Mr. Cope's and my letters to the Foreign Office on the subject have been laid before the Board and by this mail Mr. Cope will be written to requesting him to treat with Mr. Spruce and explain the particulars to him. If that is settled Mr. Markham will probably procure the more southern kinds and Mr. Spruce the northern.

I have recommended that two practical gardeners be sent out, they to accompany the plants in a steamer to Calcutta (for the interior, probably Assam,) and Ceylon.

Signed, W. J. HOOKER.

[The valuable correspondence of the U. S. Patent Office, and the report from the Office of the Interior Department, etc., will be found in full on page 385.]

Several plants were also presented, which had been received from the Propagating Garden of the Patent Office, with a statement of the manner of germinating and cultivating them, viz.:—

Melochia or Soap Plant (*Corchouis Olitorious*), from Egypt.

Cork Oak (*Quercus Suber*), from Spain.

Green Tea (*Thea Viridis*), from China.

Wax Tree Plant (*Rhus Succedania*), from Japan.

Wild Camomile (*Pyrethrum Caucaseum*), from Russia.

Black Tea (*Thea Bohea*), from China.

Camphor Tree (*Laurus Camphora*), from China.

These Reports were referred to the Executive Committee, and those parts requiring the action of the Association, to the Special Committee on Deferred Business.

The Chair appointed the Committee on Home Adulterations for the ensuing year, as follows: —

Charles T. Carney, of Boston, Chairman.
Israel J. Grahame, Baltimore.
Charles Bullock, Philadelphia.
A. P. Sharp, Baltimore.
E. R. Squibb, New York.
E. S. Wayne, Cincinnati.

The reading of papers on subjects referred last year was resumed; the following were read and referred to the Executive Committee.

Query 16th. "On fitting up and ornamenting Drug Stores." By Frederick Hale, of New York. Page 313.

Query 17. "On the action of Oxide of Silver with organic matter." By Ambrose Smith, of Philadelphia. Page 308.

Query 18. "On Polygalic Acid, and its desirability as a substitute for preparations of Senega." By Wm. Procter, Jr., of Philadelphia. Page 297.

Query 19. "On the Bark of the Larix Americana." H. T. Cummings remarked that his engagements had prevented attention to the subject. On motion, Dr. Cummings was excused.

Query 1. "On the best means of keeping the Vegetable Extracts." An answer to this question was read by Israel J. Grahame, of Baltimore.

Query 20. "On New England Carrageen." Mr. Carney stated that unavoidable circumstances had prevented Mr. Melzar from giving attention to the subject. By request it was continued to Mr. Melzar for another year.

Query 21. "On the Culture of Crocus Sativus in this country." Mr. Garrigues reported for Mr. F. L. Johns, that the culture of the plant had been abandoned, and that Mr. Johns had no farther report to make.

Query 22. "On the destruction of the Alkaloids of Belladonna and Hyoscyamus by Potash." No answer was received from R. H. Stabler.

Query 23. "Statistics of the manufacture of fine Chemicals in England, for exportation to the United States." Mr. Haviland informed the Association that he had been unable to obtain the necessary information.

Query 24. "On the Drug Trade of the United States." No answer was received from C. B. Guthrie.

Query 25. "On the nature of the yellow matter associated with Cantharidin." By request this subject was continued to Mr. John M. Maisch.

Query 27. "On the purgative power of the marc of Castor beans." No report was received from R. H. Stabler.

Query 28. "On Cornus Florida." A paper on this subject from J. M. Maisch, of Philadelphia, was read by Samuel S. Garrigues. Page 315.

Query 29. "On the relative Therapeutic value of imported and indigenous medicinal plants." A report on this subject, by Henry A. Tilden, of New Lebanon, New York, was read by Edward Parrish. Page 325.

The following report was received from the Committee on Statistics of Importation of Drugs, &c.:—

The Committee to whom was referred the subject of Suppression of Reports of the Importations of Drugs and Chemicals, have attended to the subject, and beg leave to report the accompanying Petition, to be forwarded by the President of this Association to the Secretary of the Treasury of the United States. And which they would respectfully submit to the Association.

JOHN D. DIX.
WM. A. BREWER.
WILLIAM PROCTER, JR.

Rooms of Massachusetts College of Pharmacy,
Boston, Sept. 15, 1859.

To the Hon. the Secretary of the Treasury of the United States:

Sir:—The undersigned, in behalf and by direction of the American Pharmaceutical Association, now assembled in this place, respectfully represent: That in a paper called the "Druggists Circular," issued in New York City, there has been published for a considerable time, a schedule of Drugs and Chemicals, imported from time to time into said port, prepared

under the direction, and by authority of the Drug Inspector for that District. And that said publications have been discontinued, as your petitioners have reason to believe, by instruction from your Department, under representations of their disadvantageous influence to the interests of importers of such commodities:

That, after a full discussion of the subject in this Association, embracing gentlemen engaged in the Drug business as importers and otherwise, it is believed that such publications cannot be injurious to the interests of the great body of importers of Drugs and Chemicals. That such publications are greatly subservient to the investigations of statisticians and societies for diffusing useful and commercial knowledge, &c., &c.

You are therefore respectfully requested to remove the prohibition, and permit, not only the resumption of such publications in New York, but permit them also in all the ports of entry throughout the country, with such restrictions as to names of importers as in your judgment may be deemed advisable. And as in duty bound, will ever pray.

SAMUEL M. COLCORD,
President American Pharmaceutical Association.

The Petition was adopted, and the President of the Association directed to forward it to the Secretary of the Treasury.

On motion of Wm. A. Brewer, it was directed that the plants received from the Patent Office be placed in the care of Prof. Asa Gray, of the Cambridge Botanical Garden.

The answers to referred subjects were resumed, as follows:—

Query 30. "On the culture of Arnica Flowers in this country." A verbal report from Henry A. Tilden, of New Lebanon, was made by Edward Parrish, to the effect, that Mr. Tilden had threshed several bushels of flowers, without being able to obtain any seed of the plant.

Mr. Dix, of New York, offered to obtain for the Association, if desired, the seed of Arnica, or other German medicinal plants. Mr. Dix said that in the United States, the culture of Arnica would not be profitable, on account of the high wages of labor.

Query 31. "On Pepsin." By Alexander H. Cushman, of New York. Page 319.

On motion, adjourned to 9 o'clock, on Friday morning.

Friday Morning, Sept. 16, 1859.

The Association was called to order, by Wm. Procter, Jr., of Philadelphia, Vice President, in the absence of the President, Mr. Colcord.

Mr. H. F. Fish, of Conn., offered the following resolution:—

Resolved, That a Committee of three be appointed to consider the propriety of holding Annual Sessions in the cities of New York, Philadelphia, Boston, Baltimore, and Washington, successively, in each year, and also the appointment of a permanent Secretary at Washington, D. C.

On motion, the resolution was laid on the table.

The reading of answers to referred subjects was resumed, as follows:—

Query 32. "On improved formula for Fluid Extracts." Wm. Procter, Jr., of Philadelphia, read a paper on this subject, accompanied with thirty-three specimens of Fluid Extracts. Page 265.

Edward Parrish, offered the following resolution, which was adopted.

Resolved, That the subject of offering Prizes for Scientific papers and Essays of Merit, to be read at the next Annual Meeting, be referred to the Executive Committee, with power to offer such prizes through the Pharmaceutical Journals, as they may determine upon.

Query 33. "On the extent of the culture and production of sugar, from the Sorghum Saccharatum, within the United States," &c. Robert Battey, of Rome, Georgia, read a report on this subject. Page 300.

The following resolution, offered by Charles Ellis, of Philadelphia, was unanimously adopted.

Resolved, That an elegantly bound presentation copy of the New London Edition of Pareira's, Materia Medica, be procured by the Executive Committee, and presented, on behalf of the "American Pharmaceutical Association," to Professor William Procter, Jr., for his valuable Essay on the Fluid Extracts.

Query 34. Was withdrawn.

Query 35. "On the culture of the Grape in Missouri," &c. No answer from Mr. Leitch.

Query 36. "On Liquor Ferri Iodidi." The Chair remarked that the paper on this subject had been received from W. J. M. Gordon, of Cincinnati, and had been mislaid, but would be furnished the Executive Committee. Page 289.

Query 37. [This question was continued from last year, to Mr. Peck, since deceased.]

Query 38. "On the best vehicle for disguising the taste of Quinia," &c. No answer from Mr. Payne.

Query 26. "On the odor of Vanilla." A verbal report was made by S. S. Garrigues.

Query 4. "On Mustard," &c. A paper was read on this subject by Edward Parrish, of Philadelphia. Page 283.

The answers to referred subjects having been gone through with, two volunteer papers were offered by F. Stearns, of Detroit, from Mr. Zimmerman, of Cincinnati, on the use of Catawba Wine and Brandy in Pharmacy. Page 377.

The papers were referred to the Executive Committee. Robert Battey called up the subject of the placè for the next Annual Meeting, and advocated Dr. Squibb's motion for New York.

Charles Ellis moved to substitute Columbia, S. C. After some discussion, the amendment was withdrawn.

The question being called for on the original motion of Dr. Squibb, for New York, it was carried.

Alfred B. Taylor, of Philadelphia, offered the following Preamble and Resolution:—

Whereas, The generous hospitality of the members of this Association, resident in the several localities at which meetings have been heretofore held, has been extended into an habitual degree of extravagance which has occasioned uneasiness among some members of the Association, especially in view of the migratory character contemplated in its organization; therefore,

Resolved, That we would respectfully deprecate such demonstrations, and hope that hereafter they may be discontinued, believing that by their continuance we shall be prevented from meeting in many places, where otherwise we might assemble with very great advantage to ourselves, individually, as well as to the places visited and the Association.

Mr. Parrish seconded the resolve, and after speaking of the generous hospitality extended to them in Boston, said he wanted the thing to stop here, so that they could go to small places without incumbering the few brethren there with the burden of entertaining them, when they were better able to entertain themselves.

Mr. Cushman, of New York, was opposed to the resolve, and thought these entertainments were very useful in making members acquainted with each other.

Mr. Garrigues expressed similar views, and the resolve was supported by Messrs. Meakim and Squibb, of New York, Battey, of Georgia, and Procter, of Philadelphia.

Dr. Squibb moved that the resolution lie over till next year.

It was voted to amend the resolution by substituting *resolve* for *hope*, and *shall* for *may*. The resolution, as altered, now reading,

Resolved, That we would respectfully deprecate such demonstrations, and *resolve*, that hereafter they *shall* be discontinued, believing that by their continuance we *may* be prevented from meeting, &c., &c.

The resolution as thus amended was, under the motion of Dr. Squibb, allowed to lie over till next year.

Reading of volunteer papers, being resumed,

1st. A paper from John M. Maisch, of Philadelphia, "On the behavior of essential oils to Iodine and Bromine," was partially read by Samuel Garrigues, and referred to the Executive Committee for publication. Page 338.

The Executive Committee reported the following names for membership.

John J. Toner, Wilmington, Del.
E. A. Pond, Rutland, Vermont.

A ballot was ordered; Messrs. Buck and Haviland, acting as tellers, reported both gentleman elected.

2d. Edward Parrish, of Philadelphia, read a short paper from Henry A. Tilden, of New Lebanon, describing a new powdering apparatus, accompanied by photographic views.

On motion, the Executive Committee were directed to procure a wood cut, and insert the description in the proceedings. Page 384.

3d. Mr. Cushman, of New York, read a paper "On a new apparatus for inhalation," with specimens of the apparatus. The subject of publishing papers containing accounts of patented articles, mechanical or otherwise, was discussed. It was the sense of the Association, that the Executive Committee should not publish such communications.

4th. Isaac Coddington, of New York, read a paper "On the influence of isomerism, on therapeutic power," which was referred to the Executive Committee. Page 373.

5th. Dr. Wilson H. Pile, of Philadelphia, read a paper on the specific gravities of water at different temperatures, which was referred, with the tables, to the Executive Committee, for publication. Mr. Colcord having arrived, resumed the Chair.

6th. A paper from Ferdinand F. Mayer, of New York, "On Liq. Ferri Iodidi, and the tests for iodine," was read by Wm. Procter, Jr., and referred to the Executive Committee. Page 368.

7th. Prof. Thurber, of New York, exhibited specimens of the plant producing Florida arrow root, (Zamia integrifolia,) and made a verbal communication on the subject.

On motion, Prof. Thurber was requested to embody his remarks in a paper, for publication in the Proceedings.

8th. T. Chapman Hill presented living specimens of Cantharis Atrata, sometimes confounded with cantharis bisatta. E. Parrish made some remarks on the character of the fly, stating that Dr. Leidy, of Philadelphia, had pointed out the fact that the vesicating power of the insect resided in the genital organs. Mr. Hill promised a paper on the subject next year, with a view of ascertaining whether they can be substituted for the officinal Spanish fly.

9th. Alexander Cushman, of New York, read a paper "On the comparative analysis of Price's and American Glycerine." The paper was referred to the Executive Committee. Page 383.

The Committee to bring forward subjects for investigation next year, offered the following list.

The questions not accepted or referred, were left at the disposition of the Executive Committee, to have them accepted if possible by members not present at the meeting.

The Committee to whom was referred the preparation of a list of subjects for investigation the ensuing year, report the following: —

1. Have we an indigenous vesicating agent, or agents, which may be advantageously substituted for the imported cantharides?

Accepted by William H. Warner, of Rome, Georgia.

2. It is alleged that commercial citric acid contains a variable amount of water of crystallization, according to the temperature at which it is crystallized, and that it is adulterated with tartaric acid. — Query? Is this true; if so, does the variation materially affect the value of the acid? and what is the best practical test for the demonstration of the presence of tartaric acid, for commercial use? *Accepted by Charles T. Carney, of Boston.*

3. What proportion of aconitia does the commercial aconite root yield by the process of Headland, (noted in the U. S. Dispensatory,) and what impurities remain in it not separated by the process?

Accepted by I. J. Grahame, of Baltimore.

4. The subject of the production of alcohol in the United States, viewed in reference to its manufacture from various sources, its commerce, its impurities, adulterations and tests of purity, and the statistics of its commercial relations. *Accepted by Frederick Stearns, of Detroit.*

5. Several varieties of garlic are in use in Philadelphia, and other parts of the country. Query.—Are these modifications of the same plant, or are they distinct species? *Referred to Prof. Robert P. Thomas, of Philadelphia.*

6. Aloin as discovered by T. and H. Smith, of Edinburgh, has been introduced into therapeutics. Question.—What is the best and most practicable process for its manufacture on a considerable scale; and what are the best tests for its purity as a commercial substance?

Accepted by E. Parrish, of Philadelphia.

7. The sulphate of ammonia derived from gas liquor, is now used by some manufacturers for preparing liquor ammonia, and other ammoniacal preparations of free ammonia. Question.—What are the advantages and disadvantages of using this salt instead of sal ammoniac?

Accepted by Charles Bullock, of Philadelphia.

8. The camomile flowers of commerce are occasionally attacked by an insect and greatly injured in value, and it is alleged that flowers of a chrysanthemum and of another genus, are sometimes found admixed as an adulteration in France. Question.—What is the best means of destroying the insect without injury to the flowers; and what are the adulterations of this drug as found in American commerce?

Accepted by Frederick L. John, of Philadelphia.

9. What is the active principle of arnica flowers; and what the best process for isolating it?

Accepted by Dr. Henry T. Cummings, of Portland, Me.

10. What is the best process for preparing assafœtida plaster so as to preserve the activity of the drug unimpaired?

Accepted by William Procter, Jr., of Philadelphia.

11. The Atropa Belladonna is largely grown at New Lebanon for the preparation of the officinal extract. Question.—Can the root of that plant, as grown there, be employed advantageously as a source of atropia?

Accepted by William Procter, Jr., of Philadelphia.

12. Japanese vegetable wax derived from the Rhus succedaneum has been introduced into commerce. Question.—What are the qualities of this substance, as compared with bees-wax; and how far may it be used as a substitute for that substance in pharmacy?

Accepted by James S. Melvin, of Boston.

13. Paraffin has been suggested by Mr. Wayne, of Cincinnati, as a substitute for wax in cerates. Question.—Are there any therapeutic objections to this substitution; and if not, in what proportion should it be used as a substitute for wax in cerate?

Accepted by Charles T. Carney, of Boston.

14. To what extent is carrageen collected on the coast of New England for the supply of commerce?

Accepted by A. P. Melzar.

15. Conium maculatum has become naturalized in New England and New York. Question. — Can the seeds be collected in sufficient quantity for the preparation of conia as an article of commerce?

Accepted by Henry F. Fish, of Waterbury, Conn.

16. What are the adulterations of saffron as found in the commerce of the United States, and by what tests may they be distinguished?

Accepted by J. D. Dix, of New York.

17. Cubebs are occasionally adulterated with a capsular berry, different from cubebs in appearance, and which, it is said, is done at Singapore. Question.—What plant yields this berry, and what are the properties of the berry as compared to cubebs?

Accepted by Prof. George Thurber, of New York.

18. What proportion of digitalin can be procured from American grown digitalis; and are its properties identical with the imported digitalin?

Accepted by S. S. Garrigues, of Philadelphia.

19. Can elaterium be profitably produced in the United States? What soil and situations are most favorable to the development of the plant; and how does the elaterium produced compare with the best European drug?

Accepted by Henry A. Tilden, of New Lebanon, N. Y.

20. Is there an ergotized substance developed on Indian corn (Zea-mays); and if so, has it properties analogous to those of rye and wheat ergot?

Accepted by Prof. Thurber, of New York.

21. What is the best test of the therapeutical value of extract of Indian hemp, that may be applied by the apothecary, without resorting to its internal exhibition?

Accepted by Edward Parrish, of Philadelphia.

22. What is the active principle of gillenia trifoliata, and is it an alkaloid or neutral principle?

For general acceptance.

23. The commercial history, production, and statistics of extract of liquorice, including its several sources?

Accepted by John D. Dix, of New York.

24. What are the claims of guaiac (Resina guaiaci,) to be considered a balsam?

Accepted by Wm. Procter, Jr., of Philadelphia.

25. What are the changes which occur in the officinal ethereal oil, (U. S. P.) by keeping; and can these changes be retarded?

Accepted by E. R. Squibb, of New York.

26. Are the salts of morphia of present commerce, different in medicinal power from those formerly manufactured; and if so, to what cause is it to be attributed? *Accepted by E. R. Squibb, of New York.*

27. Has the average morphia strength of commercial opium from Smyrna depreciated from its earlier value; and if so, to what extent?

Aceepted by P. Wendover Bedford, of New York.

28. Several species of Krameria (Krameria lanceolata and K. canescent, &c.,) are abundant in Texas and other parts of the Southwest. Question. — Can these roots be substituted for the officinal Krameria triandra?

Accepted by Prof. George Thurber, of New York.

29. It has been asserted that hops that have been used in obtaining the lupuline of commerce, are afterwards sold as hops. Question.—Is the assertion true; and if so, to what extent is it carried on? where? and what are the best means of detecting the fraud?

Accepted by Charles A. Tufts, of Dover, N. H.

30. Patents, in their relation to pharmacy and medicine.

Accepted by Edward Parrish, of Philadelphia.

31. An inquiry as to the comparative value of the Georgia, St. Vincent's, derived from Maranta arundinaceas, Bermuda, and other arrow roots. Whether there is any distinctive characteristics arising from climate, soil, mode of preparation, or any other causes that would give a preference to either. *Accepted by Evan T. Ellis, of Philadelphia.*

32. The seed of the helianthus annual (sunflower,) is a domestic remedy for cough. It is also used for the heaves in horses. Question.—Do the seeds possess the virtue ascribed to them; if so, to what principle existing in them is their medicinal power to be attributed? and does the principle exist in other portions of the plant?

Accepted by A. Cushman, of New York.

33. European pharmacy, what are the chief differences and points of resemblance between it and our own?

Accepted by Robert Battey, of Rome, Georgia.

34. What is the most eligible method of keeping camphor in the form of powder? *Accepted by H. F. Fish, Waterbury Conn.*

35. An essay on the Guarana of Brazil.

Accepted by Henry F. Fish, of Waterbury, Conn.

36. An essay on the products resulting from the distillation of bituminous coal and allied substances.

Referred to and accepted by Wm. H. Whitmore, of Boston.

37. What are the principal sources of oil of sassafras, its mode of manufacture, and the quantity produced annually?

Accepted by A. P. Sharp, of Baltimore.

38. What are the principal sources of Pink root and Seneca root, the probable amount collected annually, and the general character of the roots as brought into the markets from the various sources?

Accepted by Lewis F. Dohme, of Baltimore.

39. The American species of the genus cantharis as regards their usefulness in medicine as vesicants, their existing quantity in view of the supply of commerce, and other information regarding them?

Accepted by F. Chapman Hill, of Philadelphia.

40. We have an indigenous plant called Pynilania oleifera, the fruit of which yields a large amount of fixed oil. Query. — Can this oil be applied to pharmaceutical purposes, and can the plant be propagated to advantage for the production of oil?

Accepted by S. S. Garrigues, of Philadelphia.

41. What are the relative properties of the new Resin of Scammony, prepared from the dried roots, and the best varieties of commercial virgin scammony?

Accepted by I. J. Grahame, of Baltimore.

42. The cacao nut (*Theobroma Cacao*); the history of its culture, products, and uses, in medicine and domestic economy?

Continued from last year, by request, to Edwd. Donnelly, M. D., Philadelphia.

43. What is the best form of press and pressing-box for the pharmaceutical laboratory on a moderate scale, combining great power with simplicity and easy manipulation? The answer to be accompanied by a correct drawing.

Continued from last year, by request, to Edward R. Squibb, New York.

44. What is the form and material for a still for the pharmaceutist, of from

two to four gallons' capacity, capable of being heated by gas or stove heat, which shall combine economy with efficiency and fitness.

Continued from last year, by request, to Edward R. Squibb, New York.

Respectfully submitted.

WILLIAM PROCTER, JR.
FREDERICK STEARNS.
CHARLES T. CARNEY.
ISRAEL J. GRAHAME.

The Committee to audit the Treasurer's Account reported —

"That the Committee for that purpose have examined the account of S. M. Colcord, Treasurer, with the vouchers presented, showing a balance in his hands due the Association of $231\frac{41}{100}$, and are satisfied that the same is correct.

"On behalf of the Committee,

CHARLES ELLIS.
JOHN MEAKIM.

On motion, a vote of thanks was presented to the late Treasurer, Samuel M. Colcord, for his services.

The subject of members in arrears with their annual dues caused some discussion.

Daniel S. Jones, of Philadelphia, offered the following resolution: —

"*Resolved* — That when any member of this Association shall have been in arrears three years, after having been annually notified of such arrearage by the Treasurer, his name shall be reported to the Executive Committee in connection with such arrearage. The Executive Committee shall then forward to such member a copy of this resolution, and, after waiting a due time for reply, shall strike his name from the roll of members, and report their action in their succeeding annual report."

As the present rules of the Association were thought to cover the ground of the resolution of Mr. Jones, it was withdrawn.

On motion of Samuel S. Garrigues, of Philadelphia, the Treasurer was directed to publish the names of members in arrears for three years.

Ambrose Smith, of Philadelphia, late Corresponding Secretary, offered the following resolution, which was adopted: —

"*Resolved* — That the Corresponding Secretary be directed to reply to the communication of the Swiss Pharmaceutical Society, at Shaufhawzer, expressing our acknowledgment of their good wishes, and reciprocating their brotherly feelings, etc.; and to inform them that as our scope of organization does

not enable us to enter into exchanges of botanical specimens, we will refer so much of their communication as relates to this matter, to the Philadelphia College of Pharmacy."

The Committee on Specimens made the following report, which was referred to the Executive Committee:—

The Committee appointed to examine and report upon the articles sent for exhibition before the American Pharmaceutical Association respectfully report—

That they find a large and interesting collection of chemicals, pharmaceutical preparations, and apparatus, intended for the use and convenience of pharmaceutists. The appearance and quality have attracted much notice and commendation from the members in attendance, are eminently creditable to the exhibitors generally, and afford a gratifying evidence of the progress of pharmacy and its collateral arts and sciences. To discriminate and determine intelligently the relative merits of many of the similar articles deposited by different manufacturers would be a difficult task under any circumstances, and, with the limited time and opportunity afforded the Committee, simply impossible for them. They, therefore, confine themselves to making up a list of the articles, with the names of the exhibitors and manufacturers, which they have endeavored to render as complete as possible, in order that it may be placed upon record.

CHEMICALS AND PHARMACEUTICAL PREPARATIONS.

From Powers & Weightman, Philadelphia.—Quiniæ Sulph., Morphiæ Sulph., Chloroform, Ferri et Magnesia Citras, Oxide of Zinc, Ferri Citras, Zinci Acetas, Ammonia, Nitras fus., Calcis. Phosphas. Precip., Potass. Acetas, Ammonia Oxalis, Po'assa fus, Barytæ Murias., Zinci Lactas, Ammonia Hypophosphas Cryst., Barytæ Nitras, Zinci Lactas, Cadmii Bromid. and Iodid., Ammon. Valer., Quiniæ Valerianas, Zinci Cyanuret, Morphiæ Acetas, Theine, Argenti Nitras., Cinchonia, Sal Rochelle, Ferri Sulphas., Antimonii and Potassæ Tartras.

From H. T. Cummings, Portland.—Spt. Æther Nitras, and Spt. Ætheris S. Comp.

From B. J. Crew & Co., Philadelphia.—Hypophosphites of Lime, of Soda, and Ammonia, Liebig's Cyanide of Potass., Citrate of Potassa, Gallic Acid, Cyanide of Bismuth, Ferri et Ammoniæ Citras, Chloroform.

From Tilden & Co., New York.—Eclectic Resinoid Preparations, such as Podophylin, Sanguinarin, Corydalin, &c., amounting to forty different preparations, one hundred and twenty-five different fluid extracts, twelve bottle of sugar-coated pills, and granules.

From H. Thayer & Co., Cambridge, Mass.—Large specimens of fluid extracts of Calysaya Bark, Turkey Rhubarb, Cotton Root, Squills, Ipecac, Golden Seal, Buchu, and some twelve smaller samples of other fluid extracts of medicinal plants.

From Charles T. Carney, Boston. — Solution Citrate of Magnesia, Tersulphate, and other preparations of iron, Compd. Syrup of the Hypophosphites, Tinc. Cinchonæ Ferrata.

Mr. Carney also has deposited samples of the preparations of the Portland Kerosene Oil Co., including Parafine, in mass and candles, Kerosene Illuminating Oil, Kerosene for removing grease, &c., and samples of wines and brandy from native grapes of New England, manufactured by E. Paige & Co., Mass.; also, American wines and cider, manufactured by S. H. Allen, Esq., Shrewsbury, Mass.

From Charles H. Atwood, Importer. — Specimens of fine chemicals, including Iodine, Acetate of Potass, Iodide and Bromide of Potass, Valerianate of Quinine, Dextrine, samples of Essential Oils, &c.; also, labelled shop-bottles, and jars for shop furniture.

From Robert Battey, of Rome, Geo. — Sorgho Brandy, from Sugar of Sorghum. This is a new and interesting spirit, more analogous, perhaps, to rum than to brandy; and it can be afforded, we understand, at a low price, and is free from fusel oils, and is likely to become valuable for many uses.

From J. W. Norcross & Co., Importers, Boston. — Plasters, Quevenne's Iron, Adhesive Plaster, Patent Lint, Sponge Gloves, and Fancy Articles. Book of Pharmac. Labels, issued by the Philadelphia College of Pharmacy.

From E. R. Squibb, of New York. — Ext. Coloc. Comp., in mass and in powder, Pil. Hydrargyri, Æther, Sp. Ammon. Arom., Liq. Ferri, Persesquinitrat, Chloroform, Sp. Æther S. C., Sp. Æther Nitr., Æther Fortior, Liq. Ferri Iod., Ferri et Quiniæ Citras, Ammoniæ et Ferri Sulphas, Ferri et Ammonia Citras, Bismuthi Sub Nitras and Sub Carb., Ferri et Ammoniæ Citras, Hydrargc. cum Cretæ, Ferri Sub Carb., Ferri Persulph., Pulv. Ipecac et Opii, Pulv. Rhei, Pulv. Doveri, a case containing a bottle of solution Persulph. of Iron, and a bottle of Aqua Ammonia, in the proper proportion for extemporaneously preparing the Hydrated Sesqui Oxide of Iron, for use as an antidote.

From E. Blatchford, Rockport, Mass. — Hake, Haddock, and Cod Liver Oil, and Crude Isinglass, the dry swimming bladder from which New England Isinglass is prepared.

APPARATUS.

From Chas. T. Carney, Boston. — An arrangement of apparatus for "Hydrotimetrie," or the quantitative determination of the proportions of matters held in solution in the waters of springs and rivers.

From Wm. F. Shaw, Boston. — Patent Gas Stoves and heaters, various sizes and styles, with flexible connecting tubes for attaching to ordinary gas burners.

From H. D. Lockwood, Charlestown, Mass. — Davidson's Elastic Syringe, manufactured by him.

From Lewis & Richardson, Boston. — Various styles of Lewis's Elastic and Pump Syringes.

From W. H. Pile, Philadelphia. — Specific Gravity Bottles, Thermometers for chemical purposes, Urinometers, Hydrometers, for heavy and light liquids.

From Boston & Sandwich Glass Co. — Labelled Glass Tincture Bottles and Specie Jars, Opaque Glass-covered Jars for shop furniture.

From E. Kendall, New Lebanon Springs. — Aneroid Barometer.

From Codman & Shurtleff, Boston. — English Catheters, Nursing Bottles, Ear Trumpets, Pocket Cases for Medicines, Dental Files, Speculums, Galvanic Batteries.

From the New England Glass Co. — A Glass Show-Mortar. (Silvered inside.)

From Fairbanks & Co., Boston. — Prescription and Counter Scales for Druggists' use, and Letter Scales.

From J. P. Hall. — An old bell-metal Mortar, cast in 1641, of good style and shape, and in very good preservation. Interesting from its antiquity.

Respectfully submitted.

AMBROSE SMITH,
GEORGE THURBER,
A. P. SHARP,
W. PROCTER, JR., } *Committee.*

BOSTON, Sept. 15, 1859.

The report of the Committee on Deferred Business being called up, Edward Parrish offered the following resolution, which was adopted:

Resolved, That a change in the Constitutional provision as to eligibilty to membership, introduced in the address of the retiring President (in the second session) and since reported on by the Committee, to whom that address was referred, be referred to the meeting next year.

Wm. Proctor, Jr., offered the following resolution, which was adopted:

Resolved, That in future meetings of the Association, it will greatly keep up the interest of the sessions, if it be determined to make the reading of scientific papers to proceed parallel with the other business.

Mr. Carney, chairman of the Executive Committee, wished to know the feeling of the Association on the subject of publishing the reports and papers referred to the Executive Committee; whether all the papers should be published in full, or abstracts made from some; and where the Committee should

look for the necessary funds to defray expenses, if all the matter was published.

Mr. Carney was in favor of publishing all the papers, without abridgment, as matter of great interest. The President thought the funds of the Association would be found insufficient to publish the proceedings in full, and the Executive Committee would find themselves in difficulty when they began to look about for a publisher. The subject was discussed by Messrs. Carney, Parrish, Hegeman, Grahame, Colcord and Squibb. Dr. Squibb moved to meet any deficiency in the funds of the Publishing Committee by an assessment of the members. The motion was lost.

Mr. Hegeman, of New York, offered the following preamble and resolution, which was adopted:

WHEREAS the Executive Committee feel considerable doubt as to the funds in hand being sufficient to meet the expenses of publication of the proceedings of the present session, therefore it is

Resolved, That they have, at as early date as practicable, as estimate made upon the cost of the same, and if the amount is deficient, immediately to issue to the members a circular, stating the amount required and requesting a contribution for the object. And, in case the amount raised should prove more than necessary, it shall be credited to the publishing account.

The following resolution, offered by Robert Battey, of Georgia, was unanimously adopted:

Resolved, That the hearty thanks of the Association are due, and cordially tendered to the members of the Massachusetts College of Pharmacy for the very munificent and brotherly manner in which they have entertained us during our present session.

On motion of Edward Parrish, the following resolution was unanimously adopted:

Resolved, That the thanks of the Association are due to the proprietors of the newspapers who have reported our proceedings at so much length, and especially to the reporters, to whose zeal and ability we owe so faithful an account of our proceedings.

On motion of Mr. Kiersted, of New York, the thanks of the Association were tendered to the President, Secretary and Treasurer, for their services during the session.

On motion of Mr. Kiersted, the late acting President, Dr. Battey was requested to furnish a copy of his address to be incorporated in the proceedings.

On motion of Edward Parish, it was directed that any paper which had not come to hand, be referred to the Executive Committee.

The President asked permission to add to the Committee appointed to obtain an act of incorporation from Congress — after the close of the session.

On motion of E. R. Squibb, the President was empowered to add to, remodel, or fill vacancies in any of the appointed committees during the recess.

The Committee on Act of Incorporation was afterwards remodelled as follows —

EDWARD H. ROLLINS,
JAMES N. CALLAN,
WM. A. BREWER,
JOHN L. KIDWELL,
HENRY T. KIERSTED,
F. S. WALSH,
EDWARD R. SQUIBB,
R. H. STABLER.

The Chair returned thanks for the courtesy received at the hands of the Association.

The minutes were read and approved; and on motion, the Association adjourned to meet in the city of New York on the second Tuesday in September, 1860, at 3 o'clock, P. M.

C. BULLOCK, *Secretary.*

REPORTS OF COMMITTEES.

REPORT OF THE COMMITTEE ON THE PROGRESS OF PHARMACY.

The Committee appointed at Washington last year to prepare a record of the progress of Pharmacy during the then ensuing year, offer the following as their Report; but before entering upon the details it embraces, it is proper to state that the recommendation of the Committee of 1857 to make the notices *critical*, as well as merely historical, was duly considered, but not accepted for the reason that to do so would have extended the report much beyond the proper limits of such a paper, under the present circumstances of the Association. The Committee believe that the very condensed notices of discoveries and improvements in Pharmacy, and the sciences allied to it, will, by affording a suggestive bird's-eye view within a small space, accompanied as it is by careful references to the authorities, prove more useful than an abridgement of the papers.

MATERIA MEDICA.

Anthemis cotula. — William H. Warner, (Amer. Jour. Pharm., Sept., 1858, p. 388,) has made a proximate analysis of this plant, and found oxalic, valerianic, and tannic acids, chlorophylle, albumen, acrid oleo-resin, bitter extractive volatile oil, and salts of potassa, lime, magnesia and iron. The vesicant power of the bruised fresh plant is probably due to the oleo-resin.

Matico. — John J. Stell, Jr., in an inaugural essay presented to the Philadelphia College of Pharmacy, March, 1858, (see

Amer. Jour. Pharm., Sept., 1858,) has repeated the analysis of this drug. His results corroborate the conclusion of Mr. Wiegand that the maticin of Dr. Hodges does not exist, but that matico owes its power to volatile oil and resin.

French Salep. — Salep is prepared in France from the tubers of orchis mascula, by washing, rubbing off their epidermis, and then plunging them in boiling water until they begin to swell, to burst the starch granules, and to rid them of a volatile, disagreeable principle existing in the recent tuber, when they are strung on a string and dried.—(Répertoric de Pharm., 1858.)

Persian Saffron. — This drug is collected near Tifflis, partially cured, and sent to Constantinople in goat skins, where it is again manipulated.—(Répertoire de Pharm., 1858.)

Conyza Squamosa. — M. Timbal Lagrave (Rép. de Ph.) has observed this plant as an adulteration of digitalis, in the market of Toulouse, France.

Caffein. — M. Vogel (Jour. de Chimie Med., 1858) gives a process for extracting caffein from ground green coffee, by the aid of benzole, which quickly dissolves the caffein and fixed oil. The solvent is then distilled off, and the residue, by treatment with boiling water, filtering and concentrating, affords the caffein in crystals.

Wood of Ziziphus Sativa, or Jujube, was found by M. Latour (Jour. de Chimie Med., Juin, 1858) to contain crystallizable ziziphic acid, zizipho-tannic acid, and erythro-ziziphic acid, a coloring principle.

Croton Oil. — Thomas Schilippe, (Amer. Jour. Pharm., Sept. 1858, from Liebig's Annalen,) has investigated this oil, and arrives at the following conclusions, viz.: 1. The oil expressed from the warmed beans was least acrid. 2. That displaced from the marc by alcohol was more acrid. 3. That obtained by evaporating the alcohol was most acrid. 4. That the caustic matter of croton oil is a resinous body, which he calls *crotonole,* $C^{18}H^{14}O^{4}$. 5. That crotonole has no purgative ac-

tion, and the purgative principle is yet undetermined. 6. That the fatty acids of croton oil are stearic, palmetic, myristic, lauric, crotonic, and angelic acids, besides one or more from the oleic series, which are united to glycerine in the fresh oil.

Oil of Angustura Bark. — Dr. Herzog (Archiv. der Pharm. and Chem. Gaz., May 15, 1858. Am. Jour. Pharm., 1858) found this oil to possess a pale wine yellow color, having an aromatic peculiar odor resembling lovage, and taste at first mild and then acrid, boiling at 511° without decomposition. Formula $C^{13}H^{12}O$.

Buckwheat considered as Food. — M. Isodore Pierre has investigated the value of this cereal, as an alimentary substance, and finds that the finest bolted flour contains much less nitrogen and phosphates than the coarse.—(Am. Jour. Pharm., 1858, p. 426.)

Emodin. — Dela Rue and Müller (Quarterly Jour. Chem. Sci., May, 1858, and Amer. Jour. Pharm., p. 443, 1858,) whilst examining the deposit in tincture of rhubarb, discovered this principle, emodin, which has the empyrical formula $C^{30}H^{15}O^{13}$. They also further investigated the three resins and crysophanic acid of rhubarb.

New Grenada Bark. — Herr Karsten, by numerous analyses of the bark of Cinchona lancifolia, made at its place of growth, has shown that the proportion of alkaloids varies exceedingly, owing to climate and soil, especially the former. He considers the average yield of the bark to be 2.5 per cent. of sulphate of quinia, and from 1 to 1.5 per cent. of the cinchonia salt; and that while it sometimes yields none, at others it affords 4.5 per cent. The bark of the little branches yielded little, if any, when the trunk bark afforded 1.5 per cent. of alkaloids. He also believes that the alkaloids perform some function in the growth of the plant, whereby their amount is liable to decrease at certain seasons. Observation renders it probable that a uniform climate, with due proportions of cloudy, rainy, and sunny weather, is most favorable to their develop-

ment.—(Pharm. Jour., Lond., Sept., 1858, from Berícht der Akad. der Wissench. zu Berlin, 1858.)

Alkaloids in Nux Vomica. — M. Schutzenberger (Comptes Rendus and Amer. Jour. Pharm., 1858, p. 535,) has made researches on these alkaloids, which lead him to believe that he has established the existence of *nine* new alkaloids, which are all colorless, have a very bitter taste, and an action on the animal economy analogous to that of strychnia. They are all soluble in boiling water, all contain six or eight equivalents of water of crystallization, all colored red by nitric acid like brucia, and none of them fuse by heat. The author regards them as products of transformation under the influence of vital forces.

The Thorn Apple. — Schlectendal refers the nativity of Datura Stramonium to Southern Russia.—(Amer. Jour. Pharm., Nov., 1858.)

Rhus Toxicodendron. — Dr. Joseph Khittel has made an analysis of the leaves of this plant, and attributes their poisonous properties to an alkaloid.—(Amer. Jour. Pharm., p. 542, Nov., 1858, from Wittstein's Vierteljahrs.)

Alkaloids of Hyoscyamus, Belladonna, and Stramonium. — Dr. Garrod of London asserts, and supports his assertions by experiment, that liquor potassa destroys these alkaloids so as to render them harmless and unable to dilate the pupil, but he has given no rationale of the action of the alkali.—(London Pharm. Jour., and Amer. Jour. Pharm., 1858.)

Propylamin. — W. Procter, Jr., (Amer. Jour. Pharm., March, 1859,) calls attention to this alkaloid as having been found highly useful in rheumatism by Dr. Awenazius, of St. Petersburg. A process is given for its preparation from herring pickle, by distillation with potassa. See also an additional note in the same journal, (May, 1859.)

Carburetted Iron. — M. A. Henry, Pharmacien, (Jour. de Pharm., Dec., 1858, and Amer. Jour. Pharm., March, 1859,) recommends the pulverulent residue left on calcining the pyro-

lignite of iron to be employed in medicine in doses of from one and a half to two grains three times a day, as a very efficacious chalybeate.

Gum Tragacanth.—Hugo Von Mohl (Botanische Zeitung Jahrg xiv., 1857, translated for Pharm. Jour. by Berthod Seeman, and republished in Amer. Jour. Pharm. March and May, 1859,) has made an elaborate investigation into the nature of tragacanth, and its formation and relation to the structure of the astragalus. He has determied that tragacanth is "a transformation of the cells of the medullary rays into a gelatinous mass, which, by contact with water, swells to several hundred times the size of the original structure of the cells."

Podophyllin.—Harvey Allen (Amer. Jour. Pharm., 1859, p. 206,) corroborates the results of John Cadbury, noticed in the report of last year, that it is the resin soluble in ether which is the most active constituent of the root.

Botany Bay Kino.—W. Procter, Jr., (Amer. Jour. Pharm., 1859, p. 226,) gives some researches on the properties of this kind, and of the natural juice of Encalyptus Resinifera from which it is made or derived.

Ailanthus glandulosa.—Prof. Hétet of Toulon, has shown that the bark of this tree possesses valuable vermifuge properties in the treatment of tape worm; verified in the treatment of numerous cases.—(Amer. Jour. Pharm., May, 1859, from Jour. de Pharm., March, 1859.)

Carapa touloncouna, the name of a tropical tree of Guiana, recently investigated by E. Caventou, but its medical properties not understood.—(Jour. de Pharm., March, 1859.)

Ethereal Oil of Horse Chestnuts.—M. Genevoix states (Bulletin de Therapeutique,) that this oil is used as a topical application in the early stages of gout and rheumatism. It is obtained by percolation with ether and evaporation.

Otto of Roses.—This subject has been minutely investigated during the past year, by I. Mackay, of Edinburgh, (Pharm. Jour., Feb., 1859.) By Daniel Hanbury, (ibid, April, 1859,)

and by Prof. J. Lawrence Smith, (Amer. Jour. Ph., July, 1859.) The last gentlemen witnessed the process of manufacture at Kissanlik, and Mr. Hanbury has very carefully made out the origin and commercial history of the so-called "oil of geranium," with which the otto is adulterated, which he has shown to be derived from a species of andropogon, in Northern India and is received in Turkey via Bombay, the Red Sea trade, and Mecca caravans.

Anagallis Arvensis. — Joseph Augustus Heintzelman has made an analysis of this plant, and considers its medicinal power to reside chiefly in its volatile oil, which is poisonous in doses larger than 4 or 5 minims.—(Amer. Jour. Pharm., July, 1859.)

Cetonia Aurata. — Dr. Eulenburg (Wittstein's Vierteljahrs, and Amer. Jour. Pharm., July, 1859,) states that this insect is used as a remedy for hydrophobia, in Russia, with considerable success. It belongs to the family *scarabœides* of Latr., is flat, has a strong metallic lustre, body copper-colored, upper part golden green. The powdered insect in doses of a teaspoonful is said to be sufficient for men and dogs.

Red Canella Bark. — Dr. W. F. Daniel (Pharm. Jour., April, 1859, and Amer. Jour. Pharm., July, 1859,) describes a bark having a close affinity with canella, under this name, and attributes it to a species of canella, probably *C. lauri folia*, Don. Mr. Hanbury thinks it is derived from Cinnamo-dendron corticosum, but the flowers of the plant being termitial, like those of canella alba, renders Dr. Daniel's view as more probable.

Flowers of Daphne Mezereum. — J. B. Euz has obtained *daphnin* from the flowers of this plant, and *saponin* from the root of arum maculatum.—(Wittstein's Vierteljahrs.)

Bixa Orellana. — Theodore Peckolt, of Cantagolla, Brazil, describes the culture of bixa orellana in that country, and the production of annatto from it, explaining the several modes used and qualities obtained.—(Archiv. der Pharm., March, 1859, and Amer. Jour. Pharm., July, 1859.)

Catawba Brandy. — John Zimmerman (Maryland Jour. Pharm., June, 1859, and Amer. Jour. Pharm., July, 1859,) has described his method of making brandy from the lees and pumice of Catawba grapes which produce a satisfactory product. He is of the opinion that such brandy is quite equal to the French Cognac of equal age.

Insect Powder. — This powder, celebrated throughout the East as a destroyer of insect vermin in hospitals and dwellings, large quantities of which are exported to Russia, Germany, France and the United States, is the product of Pyrethrum roseum and carneum, growing in the mountains of the Caucassus.—(Buchner's New Rep., vii., 562, and Amer. Jour. Pharm., July, 1859.)

Carbonic Acid as a Medicinal Agent. — M. Fordos has suggested an apparatus with a flexible tube and terminal pipe wherewith carbonic acid, alone or medicated with chloroform or other vapor, is applied as a local ancothetic in uterine and other affections. The gas is generated in a glass vessel, from bicarbonate of soda and tartaric acid, passes through some fragments of marble, and if to be medicated, through a sponge impregnated with the volatile substances, whereby it becomes saturated with their vapor and conveys it to the part. Hydrogen may be used in the same manner.—(Pharm. Jour., Sept., 1858, p. 183.)

Caster Fiber.— Dr. Chas. Wilson (Pharm. Jour., Sept., 1858,) gives his reasons for the existence of this animal in Scotland, in early times.

Electricity as an Agent to avoid pain in Dentistry. — By causing a current of galvanic electricity from a Smee's battery to pass through the tooth from the instrument at the moment of extraction, it has been found that pain is avoided. A committee of the Franklin Institute, of Philadelphia, who witnessed 164 operations, were satisfied that in a majority of cases the agency is effective. — (Jour. Frank. Inst., 1858.)

British Lichens.— Cuthbert Collingwood (Pharm. Jour., Jan., 1859) presents an interesting view of the characters and uses of these plants.

Narthex Assafœtida. — Dr. Duckworth (Pharm. Jour., March, 1859) gives an account of the assafœtida plant which flowered in the botanical garden at Edinburgh, April, 1858; with a figure, and some remarks on the drug.

Introduction of Cinchona into India. — The British Government in India have taken steps to introduce the cinchona tree into the mountainous districts of India. Mr. Clement Markham has been intrusted with this duty.—(Pharm. Jour., July, 1859.)

Ether vs. Chloroform. — At a recent sitting of the Imperial Academy of Medicine, Lyons, Dr. Barrier gave as his opinion that ether was less dangerous, and to be preferred to chloroform as an anæsthetic.—(Pharm. Jour., July, 1859.)

Andira Anthelmintica. — T. Peckolt has examined the wood of this tree, which is abundant in Brazil, and noted for the irritation its sawdust causes on the workmen engaged in using it; and he finds in it a peculiar coloring matter, to which he has given the name *andirin*, and an active bitter resin, to which he attributes the irritating qualities of the wood. He thinks the latter may be used in painting, and the former in medicine.—(See Chem. Gazette, (London) Jan. 15, 1859.)

Honey of the Pyrenees. — M. Leon Soubeiran (Jour. de Pharm. Sept., 1858) gives an account of the production of honey and wax in the Eastern Pyrenees, amounting annually to 200,000 lbs. of honey, and 38,000 lbs. of wax. It is called "narbonne honey."

Therapeutic employment of Pyrophosphate of Iron, as recommended by M. E. Robignet, has been reported on to the French Academy of Medicine by MM. Velpeau, Boudet and others, favorably. — (See Jour. de Pharm. 1858, vol. 34, page 265.)

Root of Jean Lopez. — M. Guibout (Jour. de Pharmacie, vo.

34) has given an elaborate essay on this old item of the materia medica.

Tillandsia Usnoides. — M. Avequin of New Orleans has examined this plant as it occurs in Louisiana, and finds its ashes to amount to 3½ per cent., of which one-third is soluble potash salts. — (Jour. de Pharmacie.)

Water of Pensacola. — M. Avequin obtained this water from a public fountain in the city of Pensacola, and finds it by analysis to be the purest natural water on record; 150,000 grains gave but 3½ grains of solid matter by evaporation.— (Jour. de Pharm.)

Daphne tarton-raira (Lin. and D. C.) — Prof. Hétet of Toulon finds this species fully equal to D. mezereum as an irritant.

Concrete juice of Mapé. — E. Cuzent, naval pharmacien (Jour. de Pharm., Ap., 1859) describes a new coloring matter from Tahiti, which is obtained by incision from Inocarpus edulis. (Forst.) It is astringent, and yields colored lakes by mordants.

Roman Camomile. — M. Timbal Lagrave (Jour. de Pharm., May, 1859) says that the Roman camomile of French pharmacy is frequently found to consist of the flowers of three distinct plants, viz., Anthemis nobilis, Crysanthemum parthenium, and Matricaria parthenoides.

Powder of decayed Wood. — M. Devergie (Bul. de Therap., March, 1859) recommends the powder of decayed wood as a substitute for lycopodium, as a siccative astringent in certain skin diseases.

Santonin. — M. De Martini (Rép. Pharm., Sept., 1858) gives an account of the physiological action of santonin, and especially of its property of causing objects to appear green to patients under its use.

Dates and Areca Nuts. — Prof. Kletinsky of Vienna (Rép. de Pharm., Oct., 1858) gives analyses of these two substances.

In 100 parts of dates he finds water 30, sugar 36.2, aqueous extractive containing gliadin 22.9, pectin and pectates 8.5, cellulose 1.5, coumarin and citric acid 0.1, ashes 0.8. In the areca nuts he found water 3.88, fatty matter 53.73, emulsin with 14.35 per cent. of nitrogen, 30.10, cellulose 3.99, sugar 6.35, ashes 2.25.

Formation of Ergot. — M. Bonorden (Bul. de la Soc. Botan. and Rép. de Pharm., Nov., 1858) gives some observations on the formation of ergot from its earliest stages in the ovary of the rye. When this is attacked by the parasitic fungus it exudes a viscous fluid. He considers the parasite to be a species of *Kentro sporium.*

Croton Oil and its Congeners. — M. Buchheim of Dorpat, (Rép. de Pharm., Jan. and Feb., 1859) gives an extensive notice of the pharmacological group, of which croton oil is the most active member.

Cod Fisheries of Norway. — A. De Maude describes the mode of conducting these fisheries, whence is derived much of the cod-liver oil used in Europe. (Bul. de la Societé d'acclimation, and Rép. de Pharm., March, 1859.)

Polygonum ariculare. — M. Paret (Jour. de Chim. Méd., 1859) recommends this new astringent as appropriate when others are not at hand.

Manufacture of Raisins and Wine in Greece. —M. Landerer (Echo Méd. Suisse and Rép de Pharm., Dec., 1858) gives an interesting account of these productions. According to this writer the Greek wines do not keep well, and M. Bouchardat attributes this to want of care in the manufacture, as regards the condition of the fruit and the wine vats. The amount of dried raisins, or currants, as we call them, produced is immense—120 to 180 English *litres* (probably pounds).

Japanese Vegetable Wax. — About 700 tons of this substance, derived from Rhus succedaneum according to Sir William Hooker, has recently been received in London from

Japan, to be used for the purpose of making candles.—(Pharm. Journal.)

Strawberries. — M. Henri Buignet has made a very elaborate examination of the fruit of the strawberry, including several species, (Jour. de Pharmacie, August, 1859). 11 varieties or species were analyzed. The author seeks to determine— 1st. The proportion of water. 2d. The nature and proportion of free acid. 3d. Nature and proportion of sugars. 4th. Nature and proportion of fatty matter. 5th. The proportion of nitrogenous matter. 6th. Proportion of the marc or insoluble matter. 7th. Other proximate principles. 8th. Mineral ingredients. He found about 90 per cent. of water; 0.08 per cent. of malic acid; 5.46 to 12.76 per cent. of sugar; nearly 1 per cent. of fatty matter, almost wholly in the seeds. He found also pectin, odorous matter (probably volatile oil) and coloring matter.

Leeches. — M. Triplier (Jour. de Pharm., August, 1859) gives some new observations on the choice, preservation, and employment of leeches.

Crystallization of Bees Wax. — M. Boettger says that if a cake of wax be laid on the surface of the water in a capsule three-fourths full, and heated carefully till the wax melts, and allowed then to cool very slowly, the surface in contact with the water will exhibit, after the cooling of the wax, evidences of crystallization in hexagonal prisms, like honeycomb.—(Jour. de Pharm., Aug., 1859.)

Note on several species of Croton. — J. J. Bennett describes (Pharm. Jour., Aug., 1859) several species of croton found in the West Indies, and related to the history of cascarilla.

Preparation of Opium in France. — M. Roux, Professor of Botany at Rochefort, has recently presented an interesting paper to the French Academy on the culture of opium in France. His researches date from 1851, and were made on eight different kinds of poppy. He finds it to contain a larger percentage of morphia than Smyrna opium, and is of the

opinion that it might become profitable in districts where the poppy is cultivated for its seed for oil-making.

Oxonized Oils. — Dr. Theophilus Thompson, in a communication to the Royal Medical and Chirurgical Society of Edinburgh, states that when fixed oils are charged with oxygen and then exposed to the sun's direct light, and so become ozonized, they are endowed with properties not before possessed, as they reduce the pulse as much as 24 beats a minute in some cases. The oils particularly tried were cocoanut oil, sunflower oil, and cod-liver oil, and Dr. Thompson thinks that they may, from their tendency to abate the pulse, be found useful in phthisis. — (Pharm. Jour., Aug., 1859.)

Borax and Sulphur. — The Louisville Medical News (Jan. 15, 1859) asserts that in Congressional Township No. 13, 52 miles from Napa city, California, there is a borax lake nearly two miles in extent. The water is so strongly saturated that at seasons it is deposited in crystalline form on the bottom. It also states that a bank of sulphur, 20 to 30 acres in extent, is found in the same vicinity, and supposed to be thirty feet thick.

Cider. — Cider in some degree is an item of the materia medica as a menstruum, and the source of the best vinegar. A writer in the Baltimore American Farmer communicates a letter from Professor E. N. Horsford, of Cambridge, on the means of improving and refining this liquid. — (See Druggists' Circular, Feb., 1859, page 39.)

Meerschaum. — For an account of this mineral as it occurs near Thebes, in Egypt, see a paper from the Archiv. der Pharm., in Druggists' Circular, page 175, August, 1859.

India Ink. — The manufacture of India ink in China is described in a paper from Augsburg Ausland, in the Druggists' Circular, Aug., 1859, page 177.

The Acrid Principle of Ranunculus Sceleratus. — O. L. Erdmann, in compliance with the request of Professor Clarus, has made an investigation of this root, and finds it to be a volatile

oil, easily changed into anemonin and anemonic acid. — (Buchner's N. Repert. and Amer. Jour. Pharm., Sept., 1859.)

Nicotiana. — John Le Conte (Journal Acad. Nat. Sci., Philad.) has investigated the species of nicotiana yielding commercial tobacco, and he arrives at the conclusion that all the so-called varieties are traceable to three species, N. tabacum, N. rustica, N. fruticosa; the first yielding the United States tobacco proper, the second affording the tobacco of East India and Persia, and the last, that of Cuba. — (Amer. Jour. Pharm., Sept., 1859.)

Ginseng. — During the past year quite an excitement has sprung up in the North-western States in regard to ginseng, with a view to its exportation to China. Much of the root at first obtained was gathered at the wrong season and was inferior in quality. Dr. Stevens, of Faribault, Minnesota, in a letter to Mr. F. Stearns, gives an account of the whole process and trade in ginseng in that State. — (Peninsular and Independ. Med. Jour. and Amer. Jour. Pharm., Sept., 1859.)

Carbonate of Lithia. — The London correspondent of the Druggists' Circular, in his letter published in the August number of that journal, states that carbonate of lithia has recently come into use as a solvent for uric acid calculi, owing to its great solvent power for that acid. Its great expense will limit its use.

Ampelopsis quinquefolia. — See a paper on this plant, in reference to its botany and medicinal qualities, in the Druggists' Circular, Sept., 1859, page 198.

Myrrh. — See an elaborate analysis of this drug, by C. Ruickoldt. — (Pharm. Centr. Blatt and the Druggist, July, 1859.)

INORGANIC CHEMISTRY, AND MINERALS.

Platinum. — See a paper on the occurrence of this metal in Southern Borneo, by Prof. Bleekrode, (Pharm. Jour., July, 1858, from Jour. Soc. Arts.)

Sulphates free from Iron. — Prof. Henry Wurtz, of Washington, gives a process for the preparation of these salts, free from iron. He first boils their solutions with deutoxide of lead, which converts the iron into ferric oxide, and then with carbonate of baryta which precipitates the iron as sesquioxide along with sulphate of baryta.

Permanganate of Potassa. — MM. Cloëz and Guignet give the result of various applications of this substance as an oxidizing agent. (See Compt. Rend., June 2d and Nov. 7th, 1858, and Amer. Jour., Pharm., Jan. 78, and March, 151, 1859.)

Solubility of sesquioxide of Chromium. — Charles T. Carney of Boston, (Amer. Pharm., March, 1859,) has shown that sesquioxide of chromium, is soluble in a weak solution of caustic alkali, during the passage of a current of galvanism, and that by this means, an ink with a chromic oxide base can be removed from a bank note without injury to the texture of the paper.

Industrial application of Baryta. — F. Kuhlmann, (Comp. Rendus. and Amer. Jour. Pharm., March, 1859,) has sought to render the valuable properties of this base available in the arts and manufactures. His first step was to avail himself of the waste acid residue of the chlorine manufacturer, always a nuisance, and convert it into chloride of barium, by roasting together native sulphate of baryta, charcoal and this impure chloride of manganese, whereby $BaO\ SO^3 + MnCl + {}^4C$ yield $Ba\ Cl.\ MnS$ and ${}^4CO$. By lixiviation nearly pure chloride of barium is obtained, which offers a ready means of using the base in preparing citric, acetic, tartartic acid, &c., by decomposing their baryta salts with SO^3.

Preservation of Timber. — F. Hewson, C. E., has given the results of numerous experiments on the preservation of timber for buildings, railroads, etc., by imbuing it with metallic solutions, such as sulphate of copper, chloride of zinc, &c., by soaking the timber placed vertically in the solutions held in

appropriate tanks. (See Jour. Frank. Inst., Jan., 1859, and Amer. Jour. Ph., March, 1859.)

Platinum Black. — C. Brunner gives an easy method of preparing this substance, by decomposing perchloride of platinum with metallic iron (as reduced by hydrogen) and an excess of HCl. (See Dingler's Polytechnic Jour. and Amer. Jour. Pharm.)

Molybdate of Ammonia. — C. Brunner, (Polytechn. Jour. and Amer. Jour. Pharm., July, 1859,) gives an improved method of preparing this salt.

Oxide of Uranium. — M. Patera gives his results, in numerous details, in the preparation of this oxide in a pure state. (Pharm. Jour., Dec., 1858, page 332.)

Equivalents of the Simple Bodies. — M. Dumas, (Pharm. Jour., vol. xviij., July, Sept. and Oct., 1858, and Jan., 1859, from Compt. Rend.,) has given a valuable résumé of this important subject, in which he endeavors to get at the laws which govern their grouping.

Peroxide of Chlorine ClO^4. — Messrs. Calvert and Davis give a new method of preparing this gas, by heating a mixture of one equivalent of chlorate of potassa, with 9 equivalents of oxalic acid well pulverized, on a water bath to 158° F., when five-sixths of the chlorine is given off in this form. (Pharm. Jour., March, 1859.)

Salts of Chromium. — M. G. Fremy, (Compt. Rend. and Pharm. Jour., May, 1859,) has given the results of a careful examination of the compounds of this metal.

Iodo-nitrate of Silver. — Dr. Hoffmann, (Pharm. Jour., July, 1859,) has described an iodo-nitrate of silver, composed of iodide and nitrate of silver. It does not appear to be a uniform compound.

Ferrocyanide of Potassium and Copper. — P. Bolley describes this new compound as having deposited from a coppering fluid, composed of sulphate of copper, sulphate of iron and cyanide of potassium. Its formula was 3 KCy, 2 Cu^2Cy, 2FeCy + 8 HO.

Calcium. — M. Lies Bodart, (Compt. Rend., July, 1858, and

Chem. Gaz., vol. 16, 329,) has produced metallic calcium by heating iodide of calcium with sodium in a close crucible. With 4 grammes of sodium, 3 grammes of calcium were obtained.

Nitrates of Iron. — A. Scheurer-Kestuer has obtained interesting results from his investigations on these salts, which throw light on the difficulties that present in making the medicinal solution of Kerr. The strength of the acid has much to do with the result — very weak acid producing proto salts with ammonia, whilst stronger acid yields basic salts with the pernitrate.— (See Chem. Gaz., Feb. 15th, 1859, from Compt. Rend.)

Acetate of Alumina. — M. Tessier (Compt. Rend. and Chem. Gaz., March 1, 1859,) has investigated the spontaneous decomposition of acetate of alumina.

Estimation of Iodine in Kelp. — Messrs. Wallace and Lamont give (Chem. Gaz., Ap. 1, 1859,) a new process for testing kelp liquors, and state that about 5000 tons of kelp is annually brought to Glasgow, valued at from $12.50 to $60.00 per ton. In the same journal, June 1st, Mr. Lamont gives an analysis of the "cut-weed kelp" of the Orkney Islands.

Anhydrous Sulphuric Acid. — M. Osann, (Chem. Gaz., May 2d, 1859,) recommends in making this preparation, to keep a coil of platina wire reaching from the bottom to the surface, when it may be distilled without fear of breaking the apparatus.

Friction Matches. — Canouil's processes for manufacturing chemical matches without phosphorus or other poison, from chlorate of potassa, peroxide of lead, &c., will be found at page 214, Chem. Gazette, June 1, 1859.

Sulphate of Baryta. — M. Pelouze gives a process for making this salt by the direct action of sulphuric acid on native carbonate of baryta, by aid of a little hydrochloric acid. — (See Chem. Gaz., June 1, 1859.)

Diffusion of Fluorine. — Prof. J. Nickles, (Jour. Pharm., Aug. and Sept., 1858,) gives an elaborate investigation of the extent to which this element is found in nature.

Arsenites of Protoxide and Sesquioxide of Iron. — M. Enon (Rep. de Pharm., Oct., 1858) gives the composition and mode of preparing these salts. The hydrated sesqui salt has the composition $2\ As^2O^3$, $3\ Fe^2O^3 + 4\ HO$, and is made by double decomposition between arsenite of potassa and sulphate of sesquioxide of iron.

Cyanide of Potassium. — M. L. Roussin (Rep. de Pharm., Dec., 1858,) has shown that by evaporating a solution of 4 equivalents of acetate of potassa, 3 equivalents nitrate of potassa and 5 equivalents caustic potassa, to fusion at 350° C, it deflagrates with energy. The black mass, when pulverized and lixiviated, affords a considerable quantity of cyanide of potassium mixed with carbonate of potassa. The author thinks this result is capable of being improved on by regulating the proportions, and perhaps by substituting other salts for the acetate, so as to get a larger yield.

Facts respecting the Nitrates. — John M. Ordway (Silliman's Journal, Jan., 1859) has investigated these salts, and especially the hydrated nitrates, and has developed some new facts in regard to them. Nearly all the hydrated nitrates have either three or six equivalents of water to each equivalent of nitric acid.

Cobalt and Nickel. — Prof. Henry Wurtz (Silliman's Jour., Jan., 1859) has discovered cobalt and nickel ores in Gaston County, North Carolina.

Dupont's Artesian Well Water, at Louisville. — Prof. J. Lawrence Smith (Silliman's Journal, March, 1859) describes this remarkable well water and gives its analysis. The water contains 915.5 grains of solid matter and 9½ grains of gases to the wine gallon. Its temperature is constant at 76½° F., and its specific gravity 1.0113.

Mouth Blowpipe. — Prof. Henry Wurtz (Silliman's Journal, March, 1859) describes a method of increasing the heat of the mouth blowpipe.

Artesian Well Water at Lafayette, Ind. — This water, called also "white sulphur water" has been analyzed by D. C. M. Wetherill. (See Silliman's Journal, March, 1859.) It contains HS., CO^2 and N, besides 427 grs. of solid matter per gallon.

Aluminium. — Prof. Nickles (Paris correspondent of Silliman's Journal, July, 1859) describes the progress of the manufacture of this metal, and especially of the discovery of a process by M. Mouray of soldering this metal with an alloy of zinc and aluminium.

Nature of Ozone. — R. Clausius (Pogg. Annal. and Philos. Mag.) gives his views of the nature of this intangible substance.

New test for Potash. — W. Plunkett (Chem. Gazette, June 1, 1858, Amer. Jour. Pharm., 1858, p. 429) suggests bitartrate of soda as a new test for potassa, preferable to free tartaric acid.

Chloride of Silver. — Prof. Rudolph Boetger, of Frankfort, recommends glucose as a reducing agent for chloride of silver under the influence of an excess of solution of carbonate of soda, heating them all together, when the reduction is readily effected.—(See Maryland Jour. Pharm., Sept., 1858, and Amer. Jour. Pharm., Nov., 1858.)

Soluble Glass. — See a paper on this subject as regards its uses, by John M. Maisch, in Druggists' Circular and (Amer. Jour. Pharm., Nov., 1858.)

Test for Iodine in Nitric Acid and Nitrates. — Prof. Stein gives a very sensitive process for detecting iodine in nitrate of soda, &c.—(Chem. Gaz. and Amer. Jour. Pharm., March, 1859.)

Caustic Soda. — Mr. Newton has taken out a patent for making caustic soda from common salt, by the agency of fluosilicic acid, obtained by the action of superheated steam on fluor spar and silica in a furnace. A fluoride of silicium and

sodium is produced, which is decomposed by lime, to get caustic soda. — (Pharm. Journal, 230, Oct., 1858.)

Carbonic Acid and Hydrosulphuric Acid in mineral waters. — M. Gaultier de Claubry has presented some views on the determination of these gases. — (Jour. de Pharm., Aug., 1859.)

Metallic Cobalt. — William Sharswood (Proc. Charleston Nat. Hist. Soc. and Amer. Jour. Pharm., 433, 1859,) gives a process for preparing this metal from the chloride of purpureocobalt of Dr. Gibbs and Geuth.

The estimation of the organic matter of the air. — Robert Angus Smith, F. R. S., (Chem. Gaz., May 2d, and Amer. Jour. Pharm., Sept. 1859,) gives a method of estimating the relative amount of the organic matter of the air, by means of a test solution of permanganate of potassa.

Relations of the soil to vegetation. — M. Boussingalt, after investigating the conditions of fertility, arrives at the conclusion, 1. That the absolute proportion of nitrogen is not in relation to fertility. 2. That nitrates and ammoniacal salts are the only compounds which convey assimilable nitrogen. 3. That a plant, in order to be capable of its normal development, must have a large volume of earth. 4. That during the process called "fallow," soil becomes less carbonaceous, and more nitrogenous. — (Comp. Rend. and Chem. Gaz., July 15, 1859.)

Tungsten Steel. — F. Mayr has discovered an alloy of tungsten and steel, which is remarkable for its hardness and tenacity. — (Chem. Central Blatt and Silliman's Jour., Sept., 1859.)

ORGANIC CHEMISTRY.

Decomposition of Quinia Salts by the Acetates. — John M. Maisch (Amer. Jour. Pharm., Sept., 1858,) continues his observations on this subject, (March, 1855,) and clears up some discrepancies noted by more recent writers regarding the composition of the crystals precipitated from a solution of sulphate of quinia, by an alkaline acetate. Mr. Maisch

shows that under some circumstances these crystals may contain some sulphate of quinia, but that there is always an excess of the acetic salt.

New test for Cinchonia. — J. Howland Bill, M. D., U. S. A., recommends ferrocyanide of potassium as a test for cinchonia, owing to its forming a yellow insoluble crystalline salt with that substance, which he considers quite characteristic.— (Silliman's Journal and Amer. Jour. Pharm., Sept., 1858.)

Myronate of Potassa. — Dr. S. Von Thielau, (Wittstein's Vierteljahrschrift, vij. 161 to 170, and Amer. Jour. Pharm., Nov., 1858,) denies the existence of the myronic acid of Bussy, but admits of the existence of a substance, subject to the action of myrosin, which thereby yields sulphocyanuret of allyle.

New test for the Alkaloids. — Phosphomolybdic acid is suggested by M. Sonnechin, (Lond. Pharm. Jour., Sept., 1858,) as a new precipitant for the alkaloids.

Melezitose. — M. Berthelot describes a new sugar under this name, (Compt. Rendus, Aug. 2, 1858, and Amer. Jour. Pharm., Jan., 1859,) extracted from the manna of Briançon, which is derived from a species of larch in Switzerland. When melezitose is dried at 230° Fahr., it has the composition of cane sugar, $C^{12}H^{11}O^{11}$, fuses at 284° F., without change. Does not reduce the potassiotartrate of copper. Diluted SO^3 converts it into glucose; NO^5 into oxalic acid; and it is imperfectly acted on by yeast.

Napellina. — F. Hubschmann states, (Rép. de Pharm., July, 1858,) that commercial aconitina contains another alkaloid, to which he has given the name of *napellina*. In its isolated state it is nearly insoluble in ether, not precipitated by ammonia, neutralizes acids, and is electrical when in powder. — (Amer. Jour. Pharm., 399, 1858.)

Alcoholic Fermentation. — M. Pasteur, (Comptes Rend., Aug. 2, 1858, and Amer. Jour. Pharm., Jan., 1859,) has determined that succinic acid and glycerine are normal results of

the alcoholic fermentation always present, and that where lactic acid is found among the results of this process, it is due to the presence and action of lactic yeast.

The Camphenic Series. — M. Berthelot has arrived at some interesting results in operating on the camphenes with platinum black. Camphene derived from artificial camphor, $C^{20}H^{16}$, is converted into common camphor, $C^{20}H\ O^2$, by its action. — (Comp. Rend. Chemist, and Amer. Jour. Pharm., Jan., 1859.)

Vanillin. — M. Gobley, (Jour. de Pharm., Jan., 1859,) has succeeded in isolating the odorous principle of vanilla in a state of purity, and finds it to be a colorless substance, crystallizing in four-sided prisms, having a strong odor of vanilla, and a hot, biting taste, fusing at 195° F., volatilizing at 302° F., but slightly soluble in cold water, largely in boiling water, and very soluble in alcohol, ether and the volatile and fixed oils. Its composition is $C^{20}H^6O^4$, whilst that of coumarin, to which it is closely allied, is $C^{18}H^6O^4$.

Strychnia. — P. Schutzenberger, (Comp. Rend. and Amer. Jour. Pharm., March, 1859,) has ascertained that strychnia may be oxidized by nitrite of potassa, and thus yield two new bases, *oxystrychnia* and *binoxystrychnia.*

Valerianate of Atropia. — H. Callman describes this salt as in white crystalline crusts, very brilliant, fuses at 89.6° F., is partially decomposed by the CO^2 of the atmosphere, smells of valerianic acid, is very soluble in water, and less so in alcohol and ether. It is neutral in composition, and contains 2 eq. water of crystallization.— (Chem. Gaz., Jan. 1, and Amer. Jour. Pharm., March, 1859.)

Rumicin. — Karl von Thann (Chem. Gaz. and Amer. Jour. Pharm., March, 1859, from Sitzungsber, der Wiss. Zu Wein, xxxi., p. 26,) proves that rumicin, from various species of rumex, is identical with crysophanic acid of rhubarb.

Iodide of Ethyle. — Dr. DeVrij gives a ready method of preparing this iodide, by saturating absolute alcohol with HCl,

and decomposing it with iodide of potassium in proportion to the chlorine absorbed. — (Chem. Gaz., Dec. 1, 1858.)

Acids of Rhubarb Leaves, Tomatoes and Quinces. — Thomas A. Lancaster has investigated the nature of the acids in these juices, and finds the acidity of rhubarb stocks to be due to binoxalate of potassa, that of quinces to malic acid, and that of tomatoes to bimalate of lime and acid citrate of potassa. — (Amer. Jour. Pharm., May, 1859.)

Bryonia Alba. — G. F. Waltz, (Wittstein's Viertelj, and Amer. Jour. Pharm., May, 1859,) gives an analysis of briony root, in which he finds *bryonin* and *bryonatin*, the former being a glucocide, and is resolved into sugar *bryoestin* and *hydrobryotin*, by the action of diluted sulphuric acid.

Volatile Oil of the seeds of the Cicuta Virosa. — Julius Trapp, (Buchner's Répertor, and Amer. Jour. Pharm., May, 1859,) has shown that this oil is identical with the oil of cummin seed, and it is also probable that the identity holds good with the oil of our indigenous cicuta maculata, described by Joseph E. Young, in the Amer. Jour. Pharm., 1855, p. 289.

Colocynth. — Dr. F. G. Waltz gives some analytical results with this drug, which show that colocynthin is a glucoside, yielding *colocynthein* and sugar, by the action of SO^3, that its composition is $C^{54}H^{42}O^{28}$, that of colocynthein being $C^{44}H^{32}O^{13}$; and further, that colocynth yields a crystalline body, *colocynthitin*. — (Wittstein's Viertelj., and Amer. Jour. Pharm., July, 1859.)

Gratiola Officinalis. — Dr. F. G. Waltz has analyzed this plant, and found in it *gratiolin*, a glucoside, which yields *gratioretin* and *gratiolatin*, by the action of SO^3. It also contains *gratiosolin* and *gratiolacrin*, besides fixed oil, resin and antirrhinic acid. — (Wittstein's Vierteljahrs, and Amer. Jour. Pharm., July, 1859.)

Samadarin is an exceedingly bitter, crystalline, neutral principle, obtained from samadara indica, of Java. It is more

soluble in water than alcohol, and is said to belong to the class of bodies of which salicin is a type. — (Amer. Jour. Pharm., July, 1859, and Chem. Gaz.)

Melampyrit, a saccharine substance, discovered in 1835, by Hunefield, is described by W. Eichler, (Buchner's Rép., and Amer. Jour. Pharm., July, 1859,) and its chemical characters and position in the saccharine group pointed out.

Althœa Paper. — Prof. Aiken, of the University of Maryland, proposes paper stained with the coloring principle of althœa rosea, or common hollyhock, as a substitute for litmus paper. The prepared paper is purplish blue, when dry — acids impart a red hue, and alkalies bluish green; the condition of neutrality being indicated by purplish blue, as in red cabbage paper. As this paper is comparatively permanent as regards the bleaching action of light, and is very cheap, Prof. Aiken thinks it may be substituted for litmus advantageously. — (Maryland Journal and Trans., June, 1859, and Amer. Jour. Pharm., July, 1859.)

Scammony and Turpeth Resins. — Dr. H. Spirgatus, of Konigsburg, has investigated (Buchner's Rép., and Amer. Jour. Pharm., July, 1859) these resins, and finds them to be glucosides, and like jalap resin, are decomposed by caustic alkalies.

Creosote from Beech Wood. — H. Hlasiwetz, (Annal. der Chemie und Pharm., and Pharm. Jour., Oct., 1858,) has investigated this variety of creosote and its compounds with alkalies, and also some of its derivative products.

Vegetable Parchment. — Dr. Hoffmann, to whom De la Rue & Co., of London, submitted this substance for examination, has given a report very favorable to its importance in the arts, which will be found in the Pharmaceutical Journal, Nov., 1858, p. 273.

Synthesis of the Hydrocarbons. — M. Marcellin Berthelot has developed this subject in an elaborate paper, republished in

the Pharmaceutical Journal, Nov., 1858, and March, 1859, which possesses much chemical interest.

Indigo as a test for Sugar. — Dr. E. Mulder, (Archiv. der Pharm., Sept., 1858,) recommends indigo as a test for grape sugar and uncrystallizable sugar, both of which are capable of discharging its color in the presence of alkalies. — (See Pharm. Jour., Feb., 1859.)

Murexide. — A notice of the chemical history of this interesting substance, by H. Fritzsche, will be found in the Pharmaceutical Journal, Dec., 1858, p. 328.

Arbutin. — M. Strecker has continued the examination of this substance, begun by Kawalier, and has developed several interesting points in connection with its chemical history, showing its parallelism with salicin, of the salicyle series, in a new series, which includes quinon, hydroquinon, and other derivatives of kinic acid. — (Liebig's Annalen, and Chem. Gaz., Feb. 1, 1859.)

Sorbic and Parasorbic Acids. — Dr. Hoffmann, (Pharm. Jour., May, 1859,) describes two new volatile acids, obtained from the berries of the sorbus aucuparia. In the preparation of malic acid from these berries, by G. Merck, of Darmstadt, he obtained a penetrating volatile oil, in which Dr. Hoffmann found the acids above referred to.

Anthemin and Anthemic Acid. — M. C. Patone, of Alexandria, has shown that the Anthemis arrensis, of Europe, contains a crystalline alkaloid, which he calls *anthemin*, and a crystalline, organic acid, called anthemic acid. — (Pharm. Jour., July, 1859.)

Crocine. — Rochelder finds, (Chem. Gaz., Sept., 1858,) that the yellow coloring matter of the fruit of the gardenia grandiflora, or Chinese yellow pods, is identical with the *crocine* of saffron, and further, that this principle is a glucoside, yielding sugar and *crocatin*, by the action of diluted SO^3. Crocatin is a dark red, amorphous powder, composed of $C^{42}H^{28}O^{11}$, and is the true dyeing principle.

Oxyquinine. — P. Schutzenberger, (Comp. Rend., and Chem. Gaz., Oct., 1858,) finds that sulphate of quinia, boiled in water with nitrite of potassa, and precipitated by ammonia, yields a granular, crystalline precipitate, which is quinia and 2 equivalents of oxygen.

Pyrogallic Acid. — A. Rosing, (Comp. Rend., June 14, 1858, and Chem. Gaz., Oct. 15, 1858,) has extended our knowledge of this substance by his investigations.

Tannin of Galls. — Kawalier, (Chem. Gaz., Nov. 15, 1858,) has closely studied this substance, but was not able to satisfactorily clear up the difficulties that appear in its constitution, nor has he corroborated Strecker's views in regard to its being gallic acid and sugar. He is satisfied that it is not constituted like salicin, nor, in his opinion, has pure tannin been yet made or isolated.

Lactic Acid. — For an elaborate investigation of this acid, as regards its equivalent and constitution, see a paper by A. Wurtz, Chem. Gaz., Dec. 1, 1858.

Trehalose is a new kind of sugar, obtained from the cocoons of a Persian insect, living on a species of echinops. It has been named and investigated by M. Berthelot.— (Comp. Rend., and Chem. Gaz., Dec. 15, 1858.)

Picric Acid. — M. Carey Lea, of Philadelphia, has investigated this acid and many of its salts. He obtained the acid from the resin of Xantherrhea hastilis, as suggested by Dr. Stenhouse. — (See Silliman's Journal, Nov., 1858.)

Thuja Occidentalis. — M. Kawalier has submitted the arbor vitæ of the United States to a very elaborate analysis, and among other constituents of less note, he finds thujine, thujigenin, and a peculiar tannic acid.— (See Chem. Gaz., Feb. 15 and Mar. 1, 1859.)

Veratric Acid. — W. Merck has re-examined this acid. By distillation with baryta in excess, it yields *veratrole*, an oily fluid, crystallizing at 59° F., and boiling at about 400° F.

Oil of Rue. — C. Greville Williams, (Chem. Gaz., Apl. 1, 1859,) has separated several aldehydes from this oil, proving it to be very complex in composition.

Quercitrin, as in oak bark, (Quercus tinctoria,) has been found by Rochelder in the flowers and leaves of the horse chestnut. — (Chem. Gaz., May 2d, 1859.)

Hæmatoxylin. — O. L. Erdmann has investigated closely this coloring principle.— (See Chem. Gaz., June 15, 1859.)

Test for Grape Sugar. — Prof. Boettger, (Wittstein's Viertelj., and Maryland Journal, Dec. 1858,) has shown that subnitrate of bismuth in the presence of a solution of carbonate of soda, is deoxydized and becomes blackish if this sugar is present when the mixture is heated.

New Process for Assaying Hydrocyanic Acid. — H. Buignet, (Jour. de Pharm., March, 1859,) gives a new process for the assaying of prussic acid liquids, based on the formation of a double cyanide of copper and ammonium, and effected volumetrically, by means of a graduated glass burette and a test liquid of sulphate of copper, containing 23.09 grammes of the salt to 1000 cubic centimetres of water. An excess of liquor ammonia is added to the liquid to be tested, and then the test liquor, as long as the blue color, which it at first produces, disappears by agitation. Each cubic centimetre of the test liquid used, indicates a milligramme of free hydrocyanic acid.

New facts relative to Lactic Yeast.— M. Pasteur has shown, (Jour. de Pharm., March, 1859,) that when lactic acid is produced by fermentation from sugar, it is occasioned by the transforming influence of a peculiar ferment analogous to beer yeast, consisting of numerous globular articulations about 1-600th of a millimetre in diameter, and in its general characters like beer yeast. M. Pasteur shows under what circumstances this yeast may be formed.

Sulphocyanhydric Ether. — M. Schlagdenhauffer, (Comp. Rend., and Jour. de Pharm., Apl., 1859,) describes this ether

as produced by the reaction between alcohol, hydriodic ether and sulphocyanide of potassium.

Koussoin. — M. Pavesi describes the active principle of Kousso, as an amorphous, resinous looking substance, deep yellow colored in powder, slightly bitter and nauseous, insoluble in water, and soluble in alcohol. He also calls it *teniin*, from its use in tape-worm. — (Jour. de Pharm., Apl., 1859.)

Chlorophylle. — According to M. Sachs, (Jour. de Pharm., June, 1859,) chlorophylle may exist in etoilated or bleached plants, and that under the influence of an oxidizing agent it is susceptible of again becoming green. Green chlorophylle may also be decolorized. The colorless chlorophylle he calls *leucophylle.*

Decolorizing Power of Seeds. — M. Harms, noticing the fact that wine of colchicum and other wines of seeds are lighter colored than the wine from which they are made, attributes the change to the decolorizing property of the seeds. — (Jour. de Pharm., June, 1859.)

Production of Cellulose and Fatty Matter, during the alcoholic fermentation from sugar. M. Pasteur, (Jour de Pharm., July, 1859,) has asserted, that from carefully conducted experiments, he has observed the production of cellulose and oily matter during the fermentation of sugar.

Solanin. — M. Otto Gmelin, (Jour. de Pharm., July, 1859,) has arrived at the conclusion that pure *solanin* is *not* nitrogenous, as by repeated crystallization from absolute alcohol, it is gradually removed. He therefore infers that it possesses no basic properties, and agrees with Zwenger and Kind, that it is a glucoside.

Oil of Cochlearia Officinalis. — M. Geiseler, (Archiv. der Pharm., and Jour. de Pharm., July, 1859,) has examined the essential oil of scurvy grass, and finds it to be an oxygenated oil of garlic, C^6H^5,OS, being in fact oil of garlic, plus 1 equivalent of oxygen. He finds that the dried leaves will not yield the oil

by distillation with water alone, but when the flour of white mustard seed is added to supply myrosin, the oil is produced. The oil is very volatile, has an odor like ether and horse radish, sp. gr. is .942, is but little soluble in water, and forms a crystalline compound with ammonia, parallel with thiosinnamin, from oil of mustard.

Rhamnoxanthin. — M. T. L. Phipson has extracted this substance from the Rhamnus frangula. It is volatile, crystallizable, of a resinous nature, soluble in alkaline fluids with a magnificent purple color, and is colored emerald green, by concentrated SO^3, which, on dilution with water, becomes yellow. — (Rép. de Pharm., Aug., 1858.)

Coloring Matter of Leaves. — M. E. Morren, has investigated the coloring matter of leaves, chlorophylle and erythrophylle, in (Bull. de la Societé Botan., and Rép. de Pharm., Sept. 1858.)

Oil of Valerian. — M. Pierlot asserts, (Rép. de Pharm., July, 1859,) that the essential oil of valerian, whether recent or old, contains 5 per cent. of valerianic acid, and that rectified from potassa it is quite neutral, and wholly inadequate to yield more valerianic acid, by oxidation or otherwise. This assertion is quite contrary to the received opinion that the acid is naturally derived from the oxidation of the valerol of the crude oil.

Salicin in the Oleander. — M. Landerer has found that the ethereal extract of the flowers of Nerium oleander, yields salicylous acid by distillation with bichromate of potassa and sulphuric acid, as indicated by the reaction of the distillate with persalts of iron. — (Wittstein's Vierteljahrschrift.)

Umbelliferon. — C. Sommer, of Marburg, (Druggists' Circular, July, 1859, from Archiv. der Pharm., Apl., 1859,) describes this new substance, which is obtained from the ethereal extracts of certain umbelliferous plants, by distilling them with water. The oil which comes over is agitated with water, and cedes to it an alkaline matter that is the substance in question. Its nature has not been well made out.

Oenolin. — M. Glénard, (Rép. de Pharm., Sept., 1858,) has given this name to a coloring matter from wine, having the composition, $C^{20}H^{10}O^{10}$.

Oil of Cloves and Oxide of Silver, when mixed together, react, and sometimes inflame. Peroxide of lead also acts on it. M. Boettger. — (Jour. de Pharm., Aug., 1859.)

Vegetable Cells. — M. Fremy has examined carefully into the composition of vegetable cells. — (Pharm. Jour., Aug., 1859.)

Determination of Tallow and Stearic Acid in Wax. — E. Geith gives processes for the analysis of wax when adulterated with these bodies, to which a note is appended by Dr. Buchner. — (See Amer. Jour. Pharm., Sept., 1859, from The Druggist.)

Determination of Tannin. — Gustav. Müller gives an improved process for ascertaining the amount of tannin in tanning materials and astringent drugs. — (Amer. Jour. Pharm., 1859, 427.)

Glycyrrizin. — Dr. T. Lade has given a new analysis of this substance, which gives $C^{36}H^{24}O^{14}$. — (See Ann. der Chemie and The Druggist, for July, 1859.)

PRACTICAL PHARMACY AND CHEMISTRY.

Liquor Ferri Iodidi. — Dr. Henry Thayer, (Amer. Jour. Pharm., 1858, 391,) recommends that glycerin be used in preparing this solution, and that it be employed to effect the combination of the iodine and iron, which it controls and moderates.

Deresinification of Essential Oils. — M. Curieux proposes a mixture of solution of borax and animal charcoal of the consistence of a thick magma, to be agitated with old essential oils, to deprive them of resins and color, and to restore their natural odors. — (See Jour. de Chem., Med. and Amer. Jour. Pharm., Sept., 1858.)

Nitrate of Silver. — M. Henry Schœrer recommends the evaporation of the cupric nitrate of silver solution from coin

to dryness, and then heating carefully till the copper salt is decomposed, when, by solution and filtration, the black oxide of copper is separated, and the solution of nitrate thus freed from copper is evaporated and crystallized.— (Rép. de Pharm.)

Oxide of Silver Pills. — It is believed, (Amer. Jour. Pharm., Sept., 1858,) that the intumescence which occurs in these pills at times, is due to the presence of grape sugar in some form, as the honey in conserve of roses. I. Faris Moore, of Baltimore, believes this occurrence to be due to tannic acid, or some other vegetable acid. — (Maryland Jour. and Trans.)

Liniment of Iodide of Potassium. — T. S. Wiegand, (Amer. Jour. Pharm., 1858, p. 406,) recommends the following formula: Take of sapo vulgaris, U. S. P., ʒ xiv., alcohol, 95 per cent., ʒ viiiss., iodide of potassium, ʒ iss., oil of garden lavender, ʒ ss. The soap is dissolved in alcohol by heat, the oil added, the iodide dissolved in the water, and all mixed warm in a suitable bottle.

Glycerole of Lactucarium. — Frederick Stearns, (Penins. and Indep., Sept., 1858, and Amer. Jour. Pharm., Nov., 1858,) gives a formula for this preparation, in which a pint of the preparation contains an ounce of lactucarium.

Syrup of Protocarbonate of Iron. — M. Dannecy, of Bordeaux, (Bull. de Ther., and Amer. Jour. Pharm., Sept., 1858,) gives a formula for a syrup of protocarbonate of iron, in which this salt is held in complete solution by virtue of the sugar. Each fluid ounce contains 4 grains of the protoxide of iron.

The Hypophosphites. — Charles Bullock, of Philadelphia, (Amer. Jour. Pharm., 1858, p. 512,) gives a process for obtaining these salts, with phosphorus and sulphuret of barium as the starting point.

The Fluid Extracts. — Dr. Henry Thayer, of Cambridge, Mass., (Amer. Jour. Pharm., Nov., 1858,) gives some general remarks on these preparations.

Charcoal Paper. — MM. Pichot and Malapert have prepared a paper imbued with animal charcoal in layers. It is

used as a filtering medium, and as a means of preserving substances from decomposition by enclosing them in it, which is effected, it is presumed, by the filtering action exerted by the paper on the air, to exclude germs of organic growth.—(Pharm. Jour., and Amer. Jour. Pharm., Nov., 1858.)

Collodion.— Alpheus P. Sharp, of Baltimore, recommends, in view of the uncertain strength of nitric acid, it being seldom over 1.40, to combine the acid process with that of Mialhe, as follows, viz: Take of nitric acid, ʒ viij., sulphuric acid, ʒ xvj., nitrate of potassa, ʒ iv., cotton, ʒ j. Dissolve the nitrate in the NO^5, the SO^3 added, and whilst yet warm the cotton is imbued in it for three minutes, washed, air dried and dissolved in 30 times its weight of a mixture of 25 parts of ether and 5 of strong alcohol.—(Maryland Jour. Pharm., 1858.)

Arnica Cerate.— N. Hynson Jennings, of Baltimore, gives a formula for making this cerate from the hydroalcoholic extract from four ounces of arnica flowers, being incorporated in a fluid form with 10 ounces wax, 6 ounces olive oil, and heated till of the proper consistence.—(Maryland College Journal, Sept., 1858.)

Elixir Cinchonæ.— Alfred B. Taylor, of Philadelphia, has published the following formula for this preparation, viz.: Take of calisaya bark ʒ iv; fresh orange peel, ʒ ij; Ceylon cinnamon and coriander, each ʒ j; anise, caraway, cardamon and cochineal, each ʒ jj; brandy ojjss, macerate 24 hours, displace with a mixture of 3 parts water and 1 part alcohol, till ojjss have passed, then add ojjss simple syrup, and mix. Other recipes, not promulgated, had been in use before.—(Amer. Jour. Pharm., Jan., 1859.)

Wild Cherry Pastilles.— William R. Warner, of Philadelphia, (see Amer. Jour. Pharm., Jan., 1859,) gives a formula for these pastilles, in which alcoholic extract of wild cherry bark (Cerasus serotina) is mixed with almond paste, gum, extract of squills, sugar and water, and divided into pastilles.

Citrate of Iron and Strychnia.— C. A. Heinitsh (Amer. Jour. Pharm., Jan., 1859,) notices this preparation favorably, but thinks the proportion of 1 of strychnia to 100 of the salt better than that of 1 to 50 originally suggested, and I. Abel, ibid, March, 1859, endorses this recommendation.

Extractum Ferri Pomatum.— John M. Maisch (Amer. Jour. Pharm., Jan., 1859,) gives an exposé of the European method of making this preparation, which is a crude malate of iron.

Citromel and Tartromel of Iodide of Iron.— John Horncastle (London Pharm. Jour., and Amer. Jour. Pharm., Jan., 1859,) asserts that citric and tartaric acids, added in certain proportion to the liquor ferri iodidi, prevents it from being decomposed by the action of the air, and suggests preparations with the above mentioned names.

Preservation of Fluid Extracts.— See remarks on this subject by John M. Maisch.—(Amer. Jour. Pharm., March, 1859.)

Syrup of Ipecacuanha.— Prof. I. J. Grahame (Maryland Jour. Pharm., Dec., 1858,) recommends a modification of I. Laidby's process for this syrup with an alcoholic extract of ipecac. Graham's process is peculiar in the manner of preparing the extract, and of incorporating it with the sugar.

Ferrated Tincture of Bark.— William S. Thompson (Jour. and Trans. of Maryland Coll. Pharm., and Amer. Jour. Pharm. March, 1859,) modifies this preparation by adding a syrup of citrate of iron and ammonia to the officinal compound tincture of cinchona. He finds that it does not precipitate, and perfectly substitutes the preparation of Mr. Simes.

Test for Chloroform.— M. Roussin (Jour. de Pharm., Sept., 1858,) finds that nitro sulphide of iron is absolutely insoluble in pure chloroform, but colors it if the smallest quantity of alcohol, pyroxylic spirit or water is present.

Preservation of Animal and Vegetable Substances.— A patent has been granted in England for a process for preserving meats and fresh vegetable substances by dipping them first in an

aqueous solution of acetate of alumina and then in a bath of tragacanth and gelatin, followed by one of acetate of alumina, and then hanging up to dry. This is repeated three times. —(Amer. Jour. Pharm., March, 1859.)

Pharmacy in Russia.— For an abridgment of an excellent paper on this subject, by Prof. C. Claus of Dorpat, by John M. Maisch, (see Amer. Jour. Pharm., March, 1859.)

Nitro Benzole.— Dr. F. Mahla, of Chicago, (Amer. Jour. Pharm., May, 1859,) gives some observations on the preparation of this substance.

Protiodide of Mercury.— Roland Seeger, of Philadelphia, recommends protacetate of mercury and iodide of potassium, to make this salt in the best way. — (Amer. Jour. Pharm., May, 1859.)

Liquor Ferri Iodide. — Dr. Robert Battey, of Rome, Georgia, suggests resort to the coil of iron wire, in addition to sugar, as a means of preserving this solution; and he prefers to attach the coil to the stopper of the vial, so as to always be at the surface as well as below. — (Amer. Jour. Pharm., May, 1859.)

New System of German Medicinal Weights. — John M. Maisch gives a tabular view (with remarks) of the new system of weights adopted by government in Prussia. — (Archiv. der Pharm., May, 1858, and Amer. Jour. Pharm., May, 1859.)

Preservation of Fluid Extracts.— See critical remarks on this subject by Henry Thayer, M. D. — (Amer. Jour. Pharm., May, 1859.)

Steam Apparatus for Pharmaceutical Purposes. —J. R. Nichols (Amer. Jour. Pharm., May, 1859,) describes a new steam heating apparatus, illustrated with a cut, which is to a certain extent automatic.

New form of Suppositories. — Dr. Pfeiffer (Jour. de Pharm., March, 1859,) recommends butter of cacao to be cast in moulds with a longitudinal cavity in the larger end, into which

the medicinal substance is introduced and then closed in. This enables the apothecary to medicate the previously prepared suppositories extemporaneously.

Solubility of the Alkaloids in Chloroform. — M. Pettenkoffer (Rép. de Pharm., and Amer. Jour. Pharm., May, 1859,) presents a tabular view of the solubility of 8 of the alkaloids in chloroform.

Chlorinated Lunar Caustic. — Prof. J. Lawrence Smith (Louisville Semi-Monthly Med. News, and Amer. Jour. Pharm., May, 1859,) gives his process for preparing stick lunar caustic with chloride of silver, to give it toughness. Henry N. Rittenhouse (in The Druggist of Cincinnati) states that according to his experience, the addition of common salt to fused nitrate of silver does give toughness to the resulting sticks, but that this is attributable to the nitrate of soda formed, and not to the chloride of silver, as when the latter is added to the nitrate it does not have this effect.

Soluble Pyrophosphate of Iron. — M. E. Robiquet (Rép. de Pharm., and Amer. Jour. Pharm., May, 1859,) gives a formula for the preparation of this salt by dissolving hydrated pyrophosphate of iron in citrate of ammonia and evaporating to dryness. It contains 64 per cent. of the former, and 29 of the latter salt.

Tin in Distilled Waters. — M. Flack (Archiv. der Pharm., and Amer. Jour. Pharm., May, 1859,) has shown that all distilled waters prepared in a tin still, contain metallic tin. The slimy precipitate in distilled medicinal waters contains nearly all of the tin, and the greasy feel of the interior of the still head he attributes to the same metal.

Rose and Orange Flower Waters. — See some practical observations on these waters (in Amer. Jour. Pharm., May, 1859.)

Solution of Tartrate of Potassa, Ammonia, and Iron. — M. Carrie states (Bull. Gen. de Therap., and Amer. Jour. Pharm., May, 1859,) that the addition of tartrate of ammonia and

potassa to a solution of tartrate of iron and potassa, renders it capable of being kept without decomposition.

Oiled Paper. — Dr. James McGhie, of the Glasgow Royal Infirmary, recommends oiled paper as a cheap substitute for oiled silk in surgical dressings. It is prepared by saturating thin strong paper by means of a brush with linseed oil, which has been boiled with litharge, acetate of lead, and sulphate of zinc, and burnt umber, in the proportion of from one to two ounces of each to the gallon of oil, and dried without heat. — (Pharm. Jour., Feb., 1859, and Amer. Jour. Pharm., May, 1859.)

Scammony Resin, obtained directly from the root. — In view of the great price of virgin scammony, and its liability to be adulterated, Mr. Clark of Sockia, in Asia Minor, suggested to Dr. Williamson of England that the untapped dried roots of Convolvulus scammonia should be extracted by alcohol. This idea has been carried out under a patent by Wm. McAndrew and Sons, and on trial of the therapeutical value of the resin thus produced by Dr. Garrod and others, it appears to be fully equal to virgin scammony of commerce. In a full account of this preparation, and of the medicinal experiments made with it, (see Pharm. Jour., March and May, 1859, and Amer. Jour. Pharm., May, 1859.)

Fluid Extracts of Buchu, Cimicifuga, Valerian, and Serpentaria. John M. Maisch has given modified processes for these fluid extracts in the Amer. Jour. Pharm., July, 1859.

Percolation. — W. Procter, Jr., has given some remarks and results in reference to this process in general, and Prof. Graham's suggestions in particular. (Amer. Jour. Pharm., July, 1859.) Edward Parrish has treated of the same subject as relates to the use of glass funnels as percolators.

Basic acetate of Lead. — Professor Rochleder states (London Pharm. Jour., Sept. 1858) that the use of a silver vessel greatly facilitates the solution of oxide of lead, in a solution of sugar of lead, as in making Goulard's extract.

To prevent concussions on boiling in glass vessels. — Dr. G. C. Wittstein recommends a glass rod to be placed in the liquid, long enough to reach from the bottom above the surface; and in liquids with high boiling points, like sulphuric acid, a platina wire of equal length is much better than quartz or fragments of glass. — (See Amer. Jour. Pharm., July, 1859, from Witts. Viert.)

Fluid extract of Buchu. — Professor I. J. Grahame (Jour. and Trans. of Maryland Col. Pharm., and Am. Jour. Pharm., 1859) gives a modified formula for this preparation, which yields it of double the ordinary strength. By a very slow and careful percolation of the buchu, previously reduced to quite a fine powder, he is able to get most of the valuable part of the buchu in the bulk of the three-fourths of the fluid extract to be made, which is reserved, and the precolation continued till the leaves are exhausted—evaporating the last liquid till it is sufficient to complete the required quantity of a pint from a pound of the leaves. The menstruum used is 2 parts of alcohol 95°, and one part of water, mixed.

Sulphurous Acid.—E. P. Authon (Dingler's Polytechn. Jour. and Amer. Jour. Pharm., July, 1859) gives an easy process for obtaining sulphurous acid by heating 2 oz. of sulphur, 25 oz. of sulphuric acid, in a glass flask. The gas is given off pure and uniformly.

New process for deodorizing Spirits. — M. Breton has ascertained that by agitating alcohol, which is contaminated with fusel oil, with a portion of olive oil, the latter seizes upon and removes the fusel oil. Small quantities of alcohol may thus be readily purified, but in operating on large quantities, the spirit is percolated through a layer of pumice stone, previously soaked in oil, held between cloth diaphragms. — (London Chem. Gazette, and Amer. Jour. Pharm., July, 1859.)

Preservation of Infusions. — Mr. Stevenson (Pharm. Jour., May, 1859, and Amer. Jour. Pharm., July, 1859) says that

infusions in bottles, heated in a vessel of water until they expand to fill the bottles, and the water surrounding them has boiled ten minutes, if then closed carefully and quickly with moist bladder, will keep for more than twelve months without loss of taste or aroma.

Fluid extract of Valerian. — Professor I. J. Grahame has published a formula for this fluid extract, which is based on the same plan as that for buchu, noticed in the preceding page, and, like it, of double the officinal strength. See also a paper by A. P. Sharp, same Journal, March, 1859. — (Jour. and Trans. of Maryland College Pharm., June, 1859.)

Aromatic Spirit of Ammonia. — See remarks by Jacob Bell on this preparation, as made by the London Pharm. (and U. S. P.) and also see a paper by Mr. Fichbourne (Amer. Jour. Pharm., Sept., 1859) in the same direction with a new formula for its preparation.

Diluted Phosphoric Acid. — William S. Thompson, (Maryland Journal of Pharmary, Sept., 1858) gives a process for this solution, in which a porcelain dish is substituted for glassware in oxidizing the phosphorus. The author believes that the acid made by his process is superior to that made from the glacial acid, for pharmaceutical purposes.

Acetic Syrup of Ipecac. — Joseph Roberts, of Baltimore, recommends syrup of ipecac to be made from a vinegar of ipecac, like syrup of squills. — (Maryland Jour. Pharm.)

Extract of Rhubarb. — Professor I. J. Grahame proposes to make this extract with alcohol, .835 sp. gr., on the principle that it extracts all the desirable ingredients, with but little of the unimportant, and can be made with less heat. The rhubarb is reduced to a powder by a sieve of 60 meshes to the linear inch, and percolated slowly so as to get a very dense liquid at first. — (See Maryland Jour. Pharm., and Amer. Jour. Pharm., Sept., 1858.)

Syrups of Rhubarb. — A. P. Sharp. See formula for simple and aromatic syrup of rhubarb, both of which retain some alcohol, in Maryland Journal of Pharmacy, Sept., 1859.

Distilled Water. — William S. Thompson, of Baltimore, has ascertained that water, which has had its organic impurity destroyed by means of permanganate of potassa before distillation, will afford a distilled water that will keep without depositing the flocculent matter that is usually found in that liquid when kept some time. — (Maryland Jour. Pharm.)

Oxide of Zinc. — Charles Caspari, of Baltimore, has given a paper on the preparation of this oxide by the apothecary. — (Maryland Jour. Pharm., June, 1859.)

Fluid Extract of Yarrow. — Charles Tilyard, of Baltimore, suggests a fluid extract of Achillea millifolium, 8 oz. to the pint, made after the manner of Professor Grahame's extract of buchu, noticed at page 84. — (See Maryland Jour. Pharm.)

Glycerole of Lead. — Charles Tilyard also suggests a mixture of 13½ fluid ounces of glycerin, 2½ fluid ounces of solution of subacetate of lead, and half a drachm of camphor as a substitute for Goulard's cerate. — (See Maryland Journal of Pharmacy, June, 1859.)

Unguentum Hydrargyri nitratis. — J. Faris Moore has suggested an increased proportion of nitric acid, and the use of olive oil for neat's-foot oil, in this preparation. — (Maryland Journal of Pharm., June, 1859.)

Mel Rosæ. — Professor Grahame has greatly improved the formula for this preparation, (see Maryland Jour. Pharm., June, 1859) in substituting diluted alcohol for water in exhausting the rose leaves, reserving the first concentrated solution, and evaporating the weaker liquids separately from the honey, till reduced to the requisite quantity, and then the honey is evaporated sufficiently to make up the measure of the formula when incorporated with the tincture of roses.

Bitter Wine of Iron. — William S. Thompson, of Baltimore, (Maryland Journal and Trans., June, 1859, and Amer. Jour. Pharm., Sept., 1859,) gives a formula for this preparation. Each fluid drachm contains one grain of Wetherill's extract of bark and 2 grs. of citrate of iron, with sherry wine as the menstruum.

Employment of Alkaline solutions in Extraction. — M. Dannecy, of Bordeaux, has broached the idea that alkaline liquids are appropriate for exhausting cinchona and other drugs containing alkaloids and neutral principles. He states that preparations of cinchona thus made are more tasteless! May it not be inferred in this case that the alkaloids giving bitterness to the cinchona had been precipitated as carbonates and thus removed from solution? In cases where apotheme exists largely as in cinchona this would be dissolved, but adds nothing to the virtues of the preparation. — (Journal de Pharmacie, March, 1859.)

Elixir of Pepsin. — M. Mialke (Jour. de Pharm., March, 1859,) gives the following formula for this preparation, viz.:

Take of amylaceous pepsin,	6 grammes,
Distilled water,	24 grammes,
White wine of Lunel,	54 grammes,
White sugar,	30 grammes,
Spirit of wine, (of Montpellier,)	12 grammes,

Dissolve and filter. Dose a tablespoonful.

Glycerole of Tar. — This preparation made with 30 parts of glycerin, 5 parts of starch and 2 of tar, is a glycamyl imbued with tar. It will be recollected that starch heated to about 300°F. in glycerin expands into a jelly and gives a consistence that has rendered it a substitute for simple ointment. (Jour. de Pharm.)

Test for Oil of Cinnamon. — M. Ulex (Jour. de Pharm., April, 1859,) suggests that oil of cinnamon if mixed with oil of cloves, the latter may be detected by NO^5, which solidifies

true oil of cinnamon and merely converts oil of cloves into a brown liquid. On the other hand potash lye solidifies oil of cloves if very concentrated, and does not so effect cinnamon.

Soap as a deodorizing agent for Alcohol. — Prof. Kletinsky, of Vienna, has discovered that crude alcohol distilled from soap is thereby deprived of its empyreumatic odor. About 4 lbs. of soap for 12 gallons of alcohol are required. Hard soda soap as free as possible from fluid oily acids is preferred. — (Jour. de Pharm., May, 1859.)

Manufacture of Glucose. — M. Anthon (Jour. de Pharm., May, 1859,) has given some remarks on the constitution of commercial glucose, and on the presence in it of a substance intermediate between sugar and dextrine, not precipitable by alcohol and yet preventing the crystallization of the glucose.

Tincture of Iodine. — M. Ant. Commaille, of Rome, (Jour. de Pharm., June, 1859,) having made numerous experiments on this tincture to ascertain what changes it undergoes by keeping, has arrived at the conclusion, 1st, that the iodine removes hydrogen and forms hydriodic acid; 2d, that this hydrogen is not derived from the water; 3d, that the oxygen ought to oxidize the carbon as there is no iodic acid formed; and 4th, that this alteration may be nearly altogether prevented by keeping the tincture in black bottles.

Caffein. — M. Vogel (Jour. de Pharm., June, 1859,) prepares caffein by extracting the ground unroasted berries with benzine, distilling off the benzine, and separating the caffein from the fatty matter by means of water and crystallizing the caffein by evaporation and cooling.

Persulphate of Iron. — M. Monsel (Jour. de Pharm., July, 1859,) gives his process for making this salt for use as a hœmostatic. W. Procter, Jr., (Amer. Jour. Pharm., Sept. 1859,) continues the subject. M. Monsel's salt has the sulphuric acid in less proportion than the ordinary persulphate, being as 1 to $2\frac{1}{2}$ instead of 1 to 3. M. Monsel considers it impor-

tant to have the salt and solution free from nitric acid and his process by using a slight excess of sulphate of iron accomplishes this object. The solution has the specific gravity 1.522.

Bisulphuret of carbon is recommended by M. Lepage, of Gisors, (Rép. de Pharm., July, 1858,) as a menstruum for extracting curcumen and anchusin. He also states that 1 part of quinia dissolved by heat in 30 parts of this liquid will on cooling geletinize its consistence.

Malic Acid. — M. Macquert suggests that the serviceberry tree (Sorbus orcuparia) be extensively cultivated in France for the preparation of malic acid from its berries, with a view to use in medicine as malate of magnesia as a substitute for the citrate of magnesia. — (Rép. de Pharm., Aug., 1859.)

Pyrophosphate of Iron. — A report to the French academy of medicine on the pyrophosphate of iron of M. Robiquet, has been made by M. Bouchardat and others. — (See Rép. de Pharm., Aug., 1859.)

New method of assaying the Cinchonas. — M. F. Grahe has ascertained that all true cinchona barks containing any of the alkaloids yield by dry distillation a volatile red colored matter, which is produced in proportion to the alkaloids present; and he deems it not only a means of ascertaining the true nature of a bark, but believes it will give a means of quickly determining the relative value of barks from the cinchonas. — (Rép. de Pharm., Oct., 1858, from Tydschrift voor Pharm.)

Carminic acid. — M. Schutzenberger gives a paper on the preparation of this principle. — (See Rép. de Pharm., Oct., 1858.)

Benzole in Pharmacy as a Solvent. — M. F. Colmar, of Paris, after various experiments with benzole as a solvent in pharmacy, arrives at the conclusion that it is ineligible. 1st, because its last traces require too much heat to dissipate, and

2d, that it is difficult to remove the remains of its disagreeable odor. — (Réport de Pharmacie, Dec., 1858.)

Oleostearates of Mercury. — Dr. Jeannels calls attention to these salts in both a chemical and pharmacological point of view, and gives formulæ for their preparation and use. He prepares them by decomposing soap with nitrate of mercury, by boiling soap with oxide of manganese, and by boiling stearic acid with oxide of mercury and water, and washing the products. — (Jour. de Méd. de Bordeaux and Rép. de Pharm., Feb., 1859.).

Test for the essential Oils. — M. Cazac, of Toulouse, (Rép. de Pharm., March, 1859,) recommends as a test for the purity of volatile oils, that they be placed in a small capsule in an atmosphere of nitrous acid gas, when the degree of oxidation that they undergo is so variable, that to a certain extent their purity or impurity may be inferred from the consistence of the results.

Hydroscopic Extracts. — M. Lachambre recommends keeping the jars containing these extracts, each in a larger jar, with quick lime beneath to absorb moisture from the enclosed air, and thus dry them.

Hydrometers. — M. Dorrault has been investigating the several scales of hydrometric tables used in France. — (Le Répertoire de Pharmacie, May, 1859.)

Bitartrate of Soda. — G. Adelmar recommends this salt as a substitute for citrate of magnesia as a purgative, and considers it much more agreeable than the neutral tartrate. — (Jour. de Chemie Méd., Jan., 1859.)

Arsenic in Bicarbonate of Soda. — M. Piron has discovered arsenious acid as an impurity in bicarbonate of soda — in Brussels. — (Jour. de Chem. Méd.)

Lard has also been found falsified by agitating it with a weak solution of carbonate of soda. — (Jour. de Chem. Méd.)

Balsam Peru has been found admixed with castor oil, and R. Wagner suggests the direct distillation of the mixture when, if castor oil be present, the distillate will contain onanthol. — (Jour. de Chem. Méd., Jan., 1859.)

Syrup of Lactucarium. — M. Gustin proposes to make this preparation by boiling half an ounce of lactucarium in a quart of water with ʒ ii of nitric acid, in a capsule, renewing the water when necessary, as it evaporates, until the nauseous odor of the lactucarium disappears. The decoction is then made into nine fluid ounces of syrup with sugar and aromatics, with ʒ iss of syrup of orange flowers. — (Jour. de Chem. Med., Ap., 1859.)

Bontigny's Fumigating Powder and Paper. — The powder consists of 55.69 bisulphate of potassa, and 44.31 of nitrate of potassa, with peroxide of manganese q.s to color. It is used by projecting small portions on a red hot surface. The paper is made by dipping unsized paper in a solution of one part of nitrate of potassa and two parts of sugar in six parts of water and drying. — (Jour. de Chem. Med., Feb., 1819.)

Acetic Tincture of Cimicifugæ. — Dr. Koehler (Druggists' Circular, page 87, Ap., 1859) proposes a tincture of cimicifuga made with 5 oz. of root, 1 oz. of diluted acetic acid, 8 oz. of alcohol, and 11 oz. of water, by maceration. He considers that it has therapeutic merit deserving attention.

Aqua Phosphorica. — Stanislaus Martin proposes to use water medicated by contact with phosphorus. — (Druggists' Circular.)

Conium Leaves. — According to a writer on the new Belgian Pharmacopæia, (Druggists' Circular, Aug., 1859) conium leaves rapidly deteriorate by keeping, and that the mere effect of drying is to deteriorate them.

Bone Phosphate of Lime. — M. Dannecy (Bul. Gen. de Ther.) recommends the use of phosphate of lime obtained by boiling powdered beef bones with alkaline water till deprived of gelatine and fats and reduced to a pulp, washing away all but the

finely divided phosphate, which is so fine as to be easily suspended.

Emulsions. — Dr. Robert Battey (Southern Medical and Surgical Journal) gives some practical remarks on this subject. — (See Druggists' Circular, Sept., 1858.)

Fluid Extract of Veratrum Viride. — Dr. Henry Thayer (Boston Med. and Surg. Journal) gives a formula for this preparation.

Stramonium Ointment. — Prof. I. J. Grahame recommends a new process for this ointment analagous in result to that of Eugene Dupuy, of New York, noticed in the N. Y. Journal of Pharmacy. — (See Maryland Journal of Pharmacy, Sept., 1859.)

Prussian Blue. — F. F. Mayer, of New York, has investigated several varieties of prussian blue, and also that known in the journals as "hydrocyanate of iron." He finds the latter to contain ferrocyanide of potassium, and to be soluble in water. — (See Amer. Jour. Pharm., Sept., 1859.)

Protein as a Medicine. — Dr. J. C. Huff, of Wheeling, Va., has used this substance therapeutically in *eczema* and *impetigo* of children, and where the assimilative process is disordered. He gives 2 to 5 grains for a dose three times daily. — (See Amer. Journ. Pharmacy, Sept., 1859.)

Soluble Citrate of Magnesia, see note on a new form of this preparation by Plummer and Kelly. (Amer. Jour. Pharm. Sept., 1859.)

Syrup of Proto Phosphate of Iron. — For a formula for this preparation, see Amer. Jour. Pharm., Sept., 1859, p. 413.

The weight of Drops. — Dr. J. J. Bernoulli (Schweizer Zeitschr. of Pharm., and Amer. Jour. Pharm., 442, 1859,) has investigated the weight of drops of different liquids used in medicine. A Swiss drachm — 3.9062 grammes of each liquid was tested as to the number of drops it would yield. The result of sixty-three liquors is recorded in tabular form. As the Swiss drachm is equal to 60.272 troy grains, the results

may be considered as applying to the troy drachm in use in the United States.

Powdered Blue Mass. — Henry M. Rittenhouse offers a new recipe for this preparation, in which the mercury is extinguished in a mixture of powdered liquorice root and sugar, moistened, and the remainder of the liquorice root, powdered sugar and the powdered rose leaves added, triturated, spread on paper to dry and finally sifted. The result is the officinal pill mass, minus the moisture, the absence of which is made up with solid matter. — (The Druggist, and Amer. Jour. Pharm., Sept., 1859, page 477.)

Liquor Cinchonæ Hydriodatis. — T. E. Jenkins, of Louisville, proposes a formula for this preparation which consists of a solution of calisaya bark obtained by percolation, with a solution of hydriodic acid obtained by the action of sulphuretted hydrogen on powdered iodine suspended in water. The strength is such that each teaspoonful contains the activity of 12 grains of cinchona and 1½ grains of iodine in the form of hydriodic acid. Mr. Jenkins has also prepared

Liquor Cinchonæ Hydriodatis cum Ferro. — This preparation differs from the above only in having two-thirds of the iodine combined with iron as protiodide, whilst only one-third exists as hydriodic acid. — (See Louisville Med. News, and Druggists' Circular, page 128, June, 1859.)

Pilulæ. — For suggestions on the officinal pills (see Pharm. Jour., 1859, and Druggists' Circular, Sept., 1859.)

TOXICOLOGY, SALE OF POISONS, ETC.

It is proposed to give a record of the more prominent cases of poisoning that have occurred during the past year as an index for reference in research in this direction.

Carbonate of Cadmium. — M. Soret (Presse Med., Belgique,) gives an instance of poisoning by the inhalation of the dust of this salt. — (Amer. Jour. Pharm., Sept., 1858.)

Arsenious Acid. — Prof. R. E. Rogers, of Philadelphia, made a postmortem research for arsenic, etc., and found arsenious acid in poisonous quantity — subsequently on examining subnitrate of bismuth of the shops he found in a majority of instances that it was contaminated with arsenic. This fact, taken in connection with the fact that the patient, alleged to have been poisoned, had taken subnitrate of bismuth, acquitted the accused. — (See Amer. Jour. Med. Science, and Amer. Jour. Pharm., 1858.)

Nicotina. — Dr. Alfred S. Taylor, of London, gives the details of an analysis resulting in the detection of nicotina in the case of a suicide. The chemical details are even more minute than those of Orfila and Staas in the case of Count ———— in Belgium. — (Pharm. Jour., June, 1859, page 620.)

Corrosive Sublimate. — A Miss White, of Chichester, England, drank a wineglass full of solution of this poison instead of camphor julep, resulting in death, in July, 1858. — (Pharm. Jour., Aug., 1858.)

Cyanide of Potassium. — I. I. McCormick committed suicide by taking this poison in a melancholy condition of mind, death ensued so rapidly that no attempt was made to save life. — (Pharm. Jour., vol. xviii., 198.)

Aconite Root. — J. E. Dubiggen committed suicide by eating the fresh roots of Aconitum napellus. He sank into a state of collapse in spite of the treatment to which he was submitted. — (Pharm. Jour., ibid.)

Prussic acid. — A Mr. Ashcombe, of Hamstead, England, committed suicide with prussic acid.

Belladonna berries. — Several children were poisoned, and one died, from eating these berries for mulberries, which a farmer had called them, careless of the result.—(Pharm. Jour., vol. 18, page 243.)

Strychnia. — A young girl of 16, daughter of a surgeon, at Stepney Union, England, came to her death from strychnia,

but under what circumstances it was taken could not be determined. — (Pharm. Jour., 245, vol. 8th.)

Cyanide of Potassium. — William Gordon, an officer of artillery, at Sandgate, England, committed suicide with solid cyanide of potassium, which he had sent for to an apothecary for the alleged purpose of cleaning gold lace. — (Pharm. Jour., vol. 18th, page 246.)

Hydrocyanic acid. — Charles Cope, an apothecary's clerk, at Brighton, England, under the depressing influence of having married under unfavorable circumstances, committed suicide with an ounce of medicinal prussic acid. (Pharm. Jour., 18th, page 245.) J. L. Blythe, a pharmaceutist of some note in London, and an analytical chemist at the time of his decease, committed suicide with prussic acid. Mr. Blythe lectured at St. Mary's hospital.—(Pharm. Jour., vol. 18th, page 247.)

Carbonate of Lead. — A case of murder, by the administration of this poison, occurred in Gloucestershire, England, in Sept., 1858, of Thomas Taylor, by his wife. (Pharm. Jour., vol. 18th, page 293.)

Phosphorus. — A woman named Phillipon, near Roanna, in France, poisoned her two children with phosphorus derived from matches, in June, 1858.—(Lancet, Oct. 2d, London.)

Prussic acid. — Joseph Skinner, surgeon, Kentishtown, England, committed suicide with this acid under the influence of intemperance. — (Pharm. Jour., vol. 18th, page 294.)

Chloride of Barium. — Sarah Allen accidentally took a teaspoonful of this salt for epsom salts. The poison had been procured by her employer for testing vinegar. Instead of giving sulphuric acid, delay was occasioned by a resort to emetics and the girl died. — (Manchester Guardian, Oct. 5th, 1858.)

Chloroform. — Pharm. Jour., vol. xviii., 295, records a case of death from the administration of this anæsthetic to a child 8 years old.

Oil of Bitter Almonds. — A laborer unloading a vessel accidentally broke a case of this oil. He got on his knees and licked some of the oil, though told its nature, and died at St. Thomas hospital. — (Pharm. Jour.)

Arsenious acid. — A wholesale case of poisoning occurred at Bradford, England, by this substance, in the following manner: A confectioner sent to a druggist named Hodgson, for a quantity of "daff" (sulphate of lime.) The druggist sent his boy to the store room for it, who mistook the arsenic for it, and weighed 12 pounds, which was delivered to the confectioner. The whole of this, with 4 lbs. gum and ʒ jss of oil of peppermint, was put into 40 lbs. of sugar and made into lozenges. Various parties who had eaten the lozenges were sickened, and of these 200 cases were ascertained and 20 deaths recorded.

Cyanide of Potassium. — George Levin, aged 29, committed suicide with this poison, near London, on the 25th of October, 1858. — (Pharm. Jour., vol. 18th, page 343.)

Prussic acid. — Two cases of suicide with this poison occurred near London — one a surgeon — the other a book publisher. This poison appears to be frequently resorted to by men of education who are led to this course. — (Pharm. Jour., Feb., 1859.)

Syrup of Poppies. — E. Freeman, an infant 18 months old, came to her death by the administration of three teaspoonfuls of syrup of poppies, by its mother.—(Pharm. Jour., Feb., 1859.)

Colchicum Wine. — A druggist's boy sold this for antimonial wine, which caused the death of an infant 9 months old. The coroner's jury blamed the employer for the accident.

Hollyberries (Ilex aquifolium.) — The Pharm. Jour. records a case of poisoning in a child eating 20 to 30 of the red berries of the English holly. The effects were violent vomiting and inflammation of the stomach.

Aconite Root. — A gardener, in distress of mind, dug up some aconite root and ate it with suicidal intent, — when too late

for antidotes, he told what he had done. On arrival at St. Mary's hospital, animal charcoal and stimulants were given unavailingly.—(Pharm. Jour., April, 1858.)

Oil of Bitter Almonds. — The Times, (London,) March 1, 1859, records a case of suicide by this oil in a man 39 years of age, from disappointment.

Another case of poisoning occurred by oil of bitter almonds being given in a mixture with syrup of violets, by mistake for oil of sweet almonds, by an assistant named Taylor, in the store of Mr. Bowman, York, England. The deceased was 15 months old and took a teaspoonful. — (Pharm. Jour., May, 1859.)

Arsenious acid. — Dr. Smethhurst, of Richmond, England, on May 11th, 1859, was tried for poisoning a lady, Isabella Banks, with whom he had been living. His object appears to have been money, and the peculiarity of the case was the association of the poison with chlorate of potash, which for a time baffled the chemist, who used Reinsch's process, but by adding a great excess of copper, it ceased to dissolve and the arsenical deposit was obtained. The deceased had been subjected to slow poisoning, and was under treatment by another physician, who became baffled, and finally suspicious, which led to the detection of the murderous process. She died May 3d.— (See Pharm. Jour., June, 630.)

Corrosive Sublimate. — Charles E. White, aged 70, potter, committed suicide with corrosive sublimate. — (Pharm. Jour., July, 1859.)

Prussic acid. — The same journal records two suicides with prussic acid, one at London and one at Liverpool.

Cantharides. — Ziporah Royal, aged 21 years, it is alleged, came to her death by the administration of cantharides in a liquid form — though the identity of the poison was not well made out. The husband is the accused party, and the occurrence took place at East Middlesex, England.—(Pharm. Jour., August, 1859.)

Arsenious acid. — In the case known as the Kirkpatrick poisoning case, (see Amer. Jour. Pharm., Sept., 1858,) Dr. Bridges detected arsenic unequivocally in a pie. The peculiarity of the case of interest to the toxicologist is the testimony of Dr. Rand used in rebutting Dr. Bridges' evidence. Dr. B. used Marsh's process, and the piece of zinc he employed was cut from a sheet which had been repeatedly tested and used with assurance of its freedom from arsenic, but which Dr. B. had not tested immediately before using in this instance. Dr. Rand gave it as his opinion that commercial sheet zinc generally contained arsenic, and that *a sheet of zinc might contain arsenic in one part and not in another.* This case points to the importance of invariably testing the zinc before the operation.

Belladonna. — An apothecary's boy, in Boston, sold a woman some *balmony* (Chelone glabra,) as alleged, and the effects were those of belladonna. It does not appear that an expert proved the identity of the leaves with belladonna — yet the court awarded $100 damages to the woman. — (Boston Med. and Surg. Jour., June 24, 1858.)

An analogous case occurred in Cincinnati, where an apothecary's clerk is alleged to have sold six ounces of extract of belladonna for that quantity of extract of taraxacum. There was no positive evidence to show that the article taken was that sold by the apothecary, nor was the identity of the substance taken, made out to be extract of belladonna, yet the jury awarded $2500 damages against the apothecary. The trial and analysis were made long after the alleged poisoning occurred, so that all recollection of the transaction, if it did occur, was erased from the remembrance of the apothecary.

Strychnia. — A case of poisoning with suicidal intent occurred in Boston, in June, 1858, with this poison. Though obtained with plausible reasons from the apothecary, the coroner's jury reflected severely upon the party selling the poison.

Nitrate of Potassa. — Passereau, a confectioner, of Paris,

obtained from the Pharmacie of M. Cazin a dose of Seidlitz powder which he took at night and after much suffering, died the next day. The powder sold by the pharmacien was nitre. The poison was sold by the son of the proprietor. The father was tried, fined 100 francs and condemned to one month imprisonment. The son was acquitted, the court taking the ground that he should not have been intrusted with the store. The deceased left a minor son whose tutor brought an action against M. Cazin, and he was adjudged to pay 200 francs damages and an annuity of 200 francs to the boy till he arrived at the age of 16 years. — (Jour. de Chim. Med., Aug., 1859.)

Phosphorus Matches. — Dr. Fueffard (Jour. de Chim. Med., August, 1859,) gives a detailed account of three cases of death by this poison, with treatment and autopsy. The use of matches as poison arises from the difficulty of procuring poison, in France. Further remarks will be found on phosphorus poisoning in the same journal for July, 1859, page 397, 399, and Feb., 1859, 77 to 87.

Nicotina. — M. Augustus Melseus, of Belgium, has written an elaborate paper on the toxicological relations of this potent alkaloid and his experiments lead him to the conclusions,

1. That nicotina can be detected long after death.

2. That the conditions incident to slow putrefaction, at a low temperature and out of contact with the air, do not destroy it.

3. That the salts of nicotina resist more powerfully the influence of putrefaction, and that this base can be isolated in a way to characterize it completely.

4. That at an elevated temperature in presence of the air, the results were negative and showed the volatilization or decomposition of the alkaloid. — (Jour. de Chim. Med., July, 1859.)

Lead Poisoning. — Dr. Prost, of Paris, has given a paper on this kind of poisoning. — (See Jour. de Chim. Med., July, 1859.)

Marsh's apparatus. — M. Chevallier gives a case where Marsh's apparatus failed to detect the presence of antimony, and points out the precautions to be used before submitting the suspected material to its action. — (Jour. de Chim. Med., May, 1859.)

Bitter Almonds. — The proprietor of a drug store in Brussels left his store in charge of a boy and went to the theatre with his wife. On his return he found his house in possession of the doctor and priest, and his boy in the last suffering prior to death. Taking advantage of his master's absence he had prepared a beverage from bitter almonds and in sufficient quantity to cause his death despite the endeavors of his physician. — (Jour. de Chim. Med., March, 1859.)

Euphorbia Splendens. — A visitor at the greenhouse of M. Poulet, of Verriers, plucked a flower from this plant and inadvertently put it in his mouth. In a few minutes the swelling of the tongue and larynx indicated that he had been poisoned by it. After a bad fright and some days' abstinence he recovered. — (Jour. de Chim. Med., May, 1859.)

Cocculus Indicus. — M. G. Della Sudda (Gazette Medicale d' Orient and Jour. de Chém. Méd., April, 1859,) gives a detailed account of this drug and its active principle, together with cases of poisoning by it.

Oxalic Acid. — Dr. Rul. Ogez (Jour. de Méd. d'Anvers and Jour. de Chém. Med., March, 1859,) gives a full account of the symptoms and results of poisoning by this acid in the case of a woman 49 years of age, who went to a druggist to procure cream of tartar, and a boy, who could neither read nor write, sold her oxalic acid, which caused death.

Camphor and Ammonia. — See Jour. de Chem., Méd. Jan., 1859, for a detailed account of poisoning by "Eau sedatif" with a notice of camphor poisoning following it.

Indian Hemp — Hachisch. — Prof. Schroff describes a highly interesting case of poisoning by Indian hemp, in the case of

Dr. Heinrich, (Dublin Quarterly Jour. and Pharm. Jour., Aug., 1859.)

Essential Oil of Elemi. — Dr. Emil Mannkoff states (Brit. and For. Med. Review and Amer. Jour. Pharm., Sept., 1859) that the volatile oil of elemi is poisonous, and possesses properties that may be usefully employed in medicine. Its formula is $C^{16}H^{8}$, and exists in elemi in about 6 per cent.

Poisonous Effects of the Yew Tree Leaves. — It is stated in The Chemist, of London, that the leaves of the yew tree are destructive to horses, causing violent inflammation of the coats of the stomach.

Cyanide of Potassium. — The Nashville Monthly Record states that a New York daguerrean artist died in three minutes from the accidental ingestion of a small piece of cyanide of potassium, and the daily papers have chronicled the death of a child, who, playing about the room of a daguerreotypist, drank from a glass some solution of the same salt, and died in a few minutes.

Gelseminum Sempervirens. — The Norfolk Va. Herald records the death of a child four years of age from sucking or eating the flowers of this plant. Death ensued in an hour after illness commenced. — (Louisville Med. News, July, 1859.)

Strychnia. — T. G. Wormsley, M. D., of Columbus, Ohio, has given a paper on the chemical reactions of strychnia, with a view to their relative delicacy. He finds tannic acid, ter chloride of gold, iodine, and bromine; of these, iodine indicates the presence in the solution of one one-hundred-thousandth. — (Silliman's Journal, Sept., 1859.)

PHARMACEUTICAL ASSOCIATIONS AND EDUCATION.

THE PHILADELPHIA COLLEGE OF PHARMACY.

This institution held the thirty-eighth session of its school of pharmacy from October to February, both inclusive, during the past season. Its matriculants numbered ninety, and its graduating class twenty-one. The faculty consists of Robert Bridges, M. D., Prof. of Chemistry; Robert P. Thomas, M. D., Prof. of Materia Medica, and William Procter, Jr., Prof. of Pharmacy. Since the spring of '38, when this institution lost parts of its library and cabinet by a fire, this branch of its interests has been revived with considerable animation. It is nevertheless true that a great lack of earnestness characterizes this body in their collective capacity, as is manifested by too little interest in many of the great objects, to promote which the institution was established, and in this relation they are behind some of their sister associations.

THE COLLEGE OF PHARMACY OF THE CITY OF NEW YORK.

This institution has continued its operations during the past year. Its school of pharmacy was continued last winter under the care of Prof. Doremus on Chemistry, and Prof. Thurber on Materia Medica, Botany, and Pharmacy. Thirty students were in attendance, and one gentleman graduated after the session. The school has issued its announcement for the ensuing winter, by which we are informed that the same courses will be continued. It is to be regretted that our New York friends, in view of their great number, and of their superior advantages of position in reference to the drug trade, should not exhibit greater energy in reference to the cause of pharmaceutical education.

THE MARYLAND COLLEGE OF PHARMACY.

This institution continues to flourish vigorously since the revival of its energies in 1855. The spirit manifested by its members, and the manner in which its meetings are conducted, are indicative of advancement. Its school of pharmacy continues to flourish, and is receiving much attention from the college. Previous to the last session Dr. Frick, Prof. of Materia Medica, having been elected to the same chair in the university of Maryland, Dr. Donaldson was elected to fill the vacancy, and who, with Prof. L. H. Steiner in the chair of Chemistry, and Prof. I. J. Grahame in that of Pharmacy, constitute the faculty. This institution withhold their diploma from students in wholesale (or drug) stores, but give to these — on complying with the terms of graduation, except the examination in practical pharmacy — a *certificate* of proficiency. The "Journal and Transactions," published by this college, has been supported admirably by the efforts of its members, and, during the current year, has been increased in size to 48 pages quarterly.

THE MASSACHUSETTS COLLEGE OF PHARMACY.

The affairs of this institution, as conducted by its Board of Trustees, appear to be judiciously managed. But, with the ample facilities at their command for a superior grade of instruction in all the branches of a thorough pharmaceutical education, why are they not accomplishing more? Why is it that so much apathy exists among the pharmaceutical profession of New England in all matters relating to a distinct scientific education for apothecaries? We are informed that the Board have made three efforts to organize a class for instruction by lectures, but the pharmaceutical body have responded so coldly that they did not succeed, although the lectures were of a high order of merit. The question why they were not patronized should be answered candidly by our New England brethren. With general education unequalled elsewhere, and a natural acuteness of intellect, especially applicable to science involving

manipulation, we are precluded from attributing this indifference to ignorance of the importance of special pharmaceutical instruction. The time and money required are a safe investment both to the employer and the student, and deserve their earnest consideration. Why should not *New* England adopt the plan of *Old* England in pharmaceutical organization? Let her members include the entire six States, with Boston as the central point. The effects of such a union might create and support a school of pharmacy, both practical and theoretical, second to none in existence elsewhere, and of whose good fruits we all might become partakers.

THE CINCINNATI COLLEGE OF PHARMACY.

There is cause to fear that our Cincinnati brethren have become lukewarm and lifeless as regards the advancement of their College of Pharmacy. The attempts hitherto made to get up a school of pharmacy have proved unsuccessful. Among so many energetic business men as may be found in the queen city of the West, certainly some vigorous leader should arise who could direct a portion of their efforts in a professional direction. Such results as are desirable require a sacrifice of time and money in their accomplishment on the part of the founders. Cannot these be produced, and Cincinnati become a centre of pharmaceutical education and influence of the first magnitude? The publication of a pharmaceutical periodical, as a private effort, marks the present year. Does not this corroborate the belief above expressed.

THE RICHMOND COLLEGE OF PHARMACY

Appears to have abandoned all efforts to continue its existence as a professional body.

THE PHARMACEUTICAL ASSOCIATION OF WASHINGTON.

This association has continued its operations regularly through the past year; but, so far as we are informed, has not

entered on any arrangement to make the association a teaching institution.

THE SAN FRANCISCO PHARMACEUTICAL ASSOCIATION.

The Committee was not able to obtain any information from this association in time for this Report.

CHICAGO COLLEGE OF PHARMACY.

At a meeting held Sept. 5th, 1859, in Chicago, Dr. F. Scammon was chosen Chairman, and J. M. Woodworth, Secretary.

On motion, the following Trustees were duly elected: Dr. F. Scammon, F. A. Bryan, F. Mahla, J. D. Paine, S. S. Bliss, Geo. Buck, E. L. O'Hara, W. H. Müller, E. O. Gale, L. F. Hunnerston.

A committee was then appointed to draft a constitution and by-laws, whereupon the following officers were elected: Dr. F. Scammon, President; F. A. Bryan, First Vice President; F. Mahla, Second Vice President; J. D. Paine, Secretary; S. S. Bliss, Treasurer.

The Trustees were instructed to take into consideration the establishment of a school of pharmacy, and to secure professors as early as practicable, that a course of lectures might be given during the coming winter.

The meeting adjourned to meet at the same place on Monday evening, Sept. 19, at 7½ o'clock.

It may not be improper to state in this connection that in March, 1857, at Melbourne, Australia, an association calling themselves "The Pharmaceutical Society of Victoria" was instituted. The Constitution of this body is modelled after that of the British Society. The union arose from an attempt by the medical profession to get a "sale of poisons" bill passed, which was successfully resisted by the chemists, and the fraternal feeling thus brought out was wisely turned to account in the establishment of the above named society.

Efforts are making to append a school of pharmacy, and already they issue a journal under the auspices of the Society.

PHARMACEUTICAL LITERATURE.

The periodical literature specially pharmaceutical, has had some accessions during the past year. The American Journal of Pharmacy, and the Druggists' Circular, have continued their issues regularly since last report.

The Journal and Transactions of the Maryland College of Pharmacy continues to be conducted in the right spirit, and has, during the current year, taken its place among the regular journals of the day, with its size doubled, being now 48 pages quarterly.

The Druggist, is the title of a monthly journal established in Cincinnati, at the commencement of the present year. It is in quarto form, with sixteen pages, three columns, each in a number, and is conducted somewhat in the style of the Druggists' Circular, as a union of science and business affairs. It is edited by Henry E. Foote, M. D., of the Ohio Medical College, assisted by E. S. Wayne and W. J. M. Gordon, and published by C. Williams, 194 Walnut street, Cincinnati.

The Druggists' Review and Chemical Times, is the title of a quarto periodical of 8 pages, issued monthly in Philadelphia, from the 1st of May, 1859, by Ivan C. Michels, editor and proprietor, and devoted more especially to the drug trade and as an advertising medium.

Journal of Materia Medica and Pharmaceutical Formulary. Published by Tilden & Co., of New Lebanon, N. Y. Edited by Drs. Bates, A. Hutchins, and H. A. Tilden. This work is both medical and pharmaceutical in its scope, and contains notices of medical botany.

Since the addition of a "pharmaceutical department" to the "*Peninsular and Independent Medical Journal*" of Detroit, mentioned last year, a similar arrangement has been made

with the "*Louisville Medical News*," by which this branch of medicine is placed under the care of T. E. Jenkins, Pharmaceutist, of Louisville.

The Quarterly Journal and Transactions of the Pharmaceutical Society of Victoria, is the title of a new journal devoted to pharmaceutical matters in Australia. Of the books relating to pharmacy and the sciences collateral to it that have been published during the past year, we do not deem it important to go into much detail.

Fownes' Elements of Chemistry. — A new edition of this valuable text book has been brought out this year in London under the supervision of Bence, Jones, & A. W. Hoffman, and from this a new American edition, under the editorship of Prof. Bridges.

Taylor on Poisons. — A new edition of this standard work has just been published by Blanchard & Lea, of Philadelphia.

Stillé's Therapeutics. — This long promised work, we are informed by the publishers, Blanchard & Lea, may be expected in November next. It will no doubt be of much interest to apothecaries.

Parrish's Practical Pharmacy. — A new edition of this excellent work is in press, and may be expected in a few weeks. We are informed that extensive additions have been made to it, and the whole carefully revised. Blanchard & Lea, Philadelphia.

Headland on the Action of Medicines in the System. — Third American from the third English edition. Lindsay & Blakiston, Philadelphia, 1859.

Selections from the Favorite Prescriptions of living American Practitioners. — By Horace Green, M. D., &c. New York: Wiley & Halsted. pp. 206. Octavo.

The American Dispensatory. — By John King, M. D. Fifth edition. Cincinnati: Wilstach, Keys & Co. 1859. pp. 1475.

Agricultural Chemistry. — Campbell's manual of scientific and practical agriculture. Lindsay & Blakiston, Philadelphia, 1859.

Familiar Letters on Chemistry, Liebig's; 4th edition, revised and enlarged. Edited by John Blythe. London, 1859. pp. 536.

Pereira's Elements of Materia Medica and Therapeutics. — Fourth edition, greatly improved. The improvements made by Dr. Carson in the American edition, have been adopted by the editors, and the U. S. Pharmacopœia has been laid under contribution. The work now extends to 2600 pages, noticing 586 articles of Materia Medica. Longman & Co., London.

Traité de Chimie Hydrologique. — By J. Lefort, Pharmacien. Paris, 1859. pp. 622. This work is devoted to the analysis of mineral waters, the purification of drinking water, and other information relating to the subject.

Manuel Pratique d'Analyse Chimique. — By M. Deschamps. (D'Avallon.) Paris, 1859.

Traité de l'Art de Formuler. — By MM. Trousseau & Réveil. Paris, 1859.

Traité Élémentaire de Physique, Chémie, Toxicologie et Pharmacie. — By C. Farrot, Paris. 2 vols., octavo.

L'Officine ou Répertoire General de Pharmacie Pratique. — By M. Dorrault. Fifth edition. Paris, 1858.

Annuaire de Therapéutique, de Matière Médicale, de Pharmacie et de Toxicologie, pour 1859. — By M. A. Bouchardat. Paris.

LIST OF BOOKS ON PHARMACY AND THE COLLATERAL SCIENCES, PUBLISHED IN GERMANY SINCE THE LATTER PART OF 1858.

O. A. Ziurek. Elementar. Handbuch der Pharmacie, mit Berücksichtigung der saemmtlichen deutschen Pharmacopœen und Medicinal verardnungen. Mit 197 Holzschnitten, 8vo. Erlangen bei Ferd. Enke.

Dr. O. C. Berg and C. F. Schmidt. Darstellung und Beschreibung saemontlicher in der Pharmacopœa Borussica auf geführten officinellen Gewachse oder der Theile und Rohstoffe welche von ihnen zur Anwendung kommen, nach natürlichen Familien. Mit colarirten Abbildungen. 4° Leipzig, Foerstnersche Buchhandlung.

E. A. Zuchold. Bibliotheca chemica. Verzeichniss der aufdem Gebiete der reinen pharmaceut., physiolog. und technischen Chemie in den Jahren 1840, bis Mitte 1858, erschienenen Schriften. 8vo. Goettingen, Vandenhoeck & Ruprecht.

Handatlas saemmtlicher medicinisch; pharmaceutischer Gewaechse. Von einem Vereine Gelehrter, 3, Auflage. 8vo. Jena bei Mauke.

Die Heilkunst und das Apothekergewerbe; ihr gegenwärtiger Zustand und Vœschlæge zu Reformen. 8vo. Friedrichshafen bei Linke.

Dr. H. O. Lenz. Botanie der alten Griechen und Rœmer; deutsch in Auszügen aus deren Schriften. 8vo. Gotha bei Thienemann.

Dr. F. Müller. Das illustrirte Kræuterbuch. Beschreibung aller Pflanzen mit Angabe ihres Gebranches, Nutzens und ihrer Wirkung, nebst Anweisung zur Sammlung und Bebanung. Mit 300 Abbildungen. 8vo. Ulm bei Elsner.

Dr. A. Schnitzlein. Iconographia familiarum naturalium regni vegetabilis. 4° Bonn bei Henry & Cohen.

Herrmann Hager. Commentar zur Preussischen, Saechsischen, Hannoverschen, Hamburgischen, und Schleswig. Holsteineschen Pharmacopäe. 2 vols., 8vo. Lissa bei Ernst Günther.

Herrmann Hager. Manuale pharmaceuticum seu Promptuarium, quo praecepta ad paranda medicamenta in pharmacopœas vulgo non recepta, atque etiam complura adjumenta, et subsidia pharmaceutica continentive. Lissa bei E. Günther.

Dr. L. Elsner. Chemisch-technische Mittheïlungen der Jahre 1857 und 1858. 8vo. Berlin.

Die Charlatanerie und ilver Parteigaenger. Eine naturwissenschaftliche commerzielle Studie von Theofrastus Bombastus Paracelsus dem Jüngeren. 12mo. Wien.

THE DRUG MARKET AND MANUFACTURES.

It has been usual, in previous reports of this committee, to endeavor to get some idea of the amount of drugs imported into the United States, and the several kinds. Early steps were taken to get the information, only obtainable from our examiners of drugs, but owing to the objection raised by importers at the port of New York, the secretary of the treasury ordered the discontinuance of the monthly list, found in the columns of the Druggists' Circular, and since July last, inclusive, only the gross values of each kind of the leading articles are published. If the names of the importers had been omitted, there could have been no reasonable objection to the continuance of the list, which was a valuable record. Prof. Aiken, the examiner of drugs at Baltimore, had promised to communicate some details regarding the drug importations at Baltimore, but illness in his family prevented its accomplishment in time for this report. Through William A. Brewer, a member of this committee, interest was made in the same object with Dr. Parmenter the examiner at Boston, but as yet no information has been obtained. It is intended, should the time permit, to make a tabular view of the importations of New York, as far as the records in the Druggists' Circular will permit, to be appended to this report.

Dr. Morrison, examiner of drugs at Philadelphia, informs us that the amount of crude drugs imported into Philadelphia through its port, is very small, nearly all being received here through New York and Boston. For the last twelve months he has not had occasion to reject a single drug, and for some two years before that, but small occasion occurred for the exercise of his rejecting power. There yet continues to be a considerable amount of chemicals imported from England and Ger-

many, direct, but they are by houses of the best standing. No opium has been entered at this port for more than twelve months past. Dr. Morrison says that the office of examiner of drugs is virtually abolished at this port, the duties being now performed by the appraisers; himself having been transferred to the position of appraiser. We have endeavored by inquiry, to get at the general character of the drug market of Philadelphia, compared with former periods. It would appear, as regards the foreign drugs and others, in their crude state, as ipecac, rhubarb, barks, etc., that they compare favorably. The article Chinese rhubarb especially, has been better, and the good effect of the drug law can be traced even under the present more relaxed exercise of its powers. There is, however, much reason to fear that the business of adulteration in powders, volatile oils, extracts, and other modified forms of drugs has not ceased. The prices at which powders, etc., are occasionally sold, renders it morally certain that they must have been tampered with, and it is not difficult to find extracts quoted at prices equal if not lower than the cost of the crude material, if of the best kind. The general good character of the wholesale druggists of Philadelphia should cause them to ferret out those parties who are so lost to the interests of humanity, and their duty as dealers in medicines, as to partake in the profits of this disreputable business.

The intensity of the competition in the sale of drugs, has caused the prices to be so lowered, that the fair dealer has but little margin in a large number of articles. Among the New England specialities, we have sought to get the statistics of isinglass and cod-liver oil. J. R. Gott, Esq., who is chiefly engaged in the isinglass manufacture, reports to Mr. Carney, that the "demand is limited and sales decrease from year to year," yet no distinct facts were given. All that is made is consigned to New York, and even the Boston market is supplied from the former place. Through the kindness of E. B. Phillips, Esq., who is the largest manufacturer of cod-liver oil

in New England, and who took some considerable pains to get at the figures, Mr. Brewer is informed that 24,000 gallons of cod-liver oil are made annually, on the American shore, between Boston and Eastport, in Maine.

Another subject of interest is castor oil. A few years ago the United States supplied quantities of oil to Europe. Now our chief supplies are obtained from the East Indies, (Calcutta,) where the oil is expressed and sent in 5 and 10 gallon cans. Each case contains 4, 5 gall. or 2, 10 gall. cans. The number of cases received at the port of Boston alone, during 1858, was 5,260, and during the present year to Sept. 1st instant, 4,131 cases have arrived. Owing to the leakage in transportation, seriously adding to cost, the attention of several gentlemen has been turned to importing the bean direct from Calcutta, so as to manufacture the oil here, and not only save the leakage, but in great measure the duty, as the beans are entered as medicinal seeds, upon which the duty, if any, is only nominal. The most of the oil thus made, is produced at New York. Mr. W. H. Boyer informs us, that during the year ending Sept. 1st, as near as could be arrived at, 16,607 bags of 3 bushels, or 140 lbs. each, had arrived from Calcutta, (50,000 bushels, or 7,000,000 lbs.) From the investigations of Wm. S. Thompson, it appears that the influence of the apothecaries of Baltimore has reacted favorably on the druggists of that place, and induced a greater attention to good quality in getting their supplies. As yet the manufacture of pharmaceutical chemicals, for the supply of druggists, is very limited in that city, and many of the apothecaries have long been in the habit of making various of the finer chemicals in their own laboratories. The quality of the practice of pharmacy, in Baltimore, has improved considerably of late years, and but few persons are now engaged in the business who have not been regularly brought up.

The Manufacture of pharmaceutical and other Chemicals, is carried on in Philadelphia to a far larger extent than in any

other locality of the United States, and their general good character is admitted. Besides chemicals proper, there are establishments, where what are called "pharmaceuticals," are largely made, including extracts, powders, fluid extracts, confections, pills, citrate of magnesia, and other chemico pharmaceutical solutions.

The business of Manufacturing Chemistry is gradually extending to other sections. New York and Boston have their establishments, and Dr. E. R. Squibb has commenced the manufacture of pure chemicals, especially for medicine, and in accordance with the pharmacopœia strength and standard. The additional price required to cover the cost of making many officinal preparations strictly by the standard will throw many of these out of competition. We may instance Oil of Wine, Hoffman's Anodyne, Spirit of Nitric Ether, as affording the heaviest contrast in prices with those of commerce.

Chemicals are now manufactured at Cincinnati and at Louisville, giving indication that the enterprise and capital of the West is seeking new channels for its investment.

NECROLOGY.

It is, perhaps, properly within the province of this Report to notice briefly the ravages which death has made among that group of individuals who as a whole have been laboring earnestly for pharmacy, or for the sciences on which it rests, and which give it uniformity and value.

Soubeiran. — This eminent pharmaceutist died at Paris on the 17th of November, 1858, in his 63d year. Soubeiran was at the head of the pharmeceutists of France, and was the first occupant of the new Professorship of Pharmacy in the Faculty of Medicine, one of the Professors in the School of Pharmacy at Paris. His work on Pharmacy is by far the most scientific treatise on that subject in French.

Lassaigne, eminent as a writer and teacher of chemistry, and author of several works, died in March last, at Paris, in his 59th year.

Tully. — Prof. Tully died at Springfield, Massachusetts, on the 28th of February, 1859. Eminent as a physician and pharmacologist. For many years he was in the Medical Department of Yale College. He did not live to finish his great work on Therapeutics.

Jacob Bell, the untiring friend of English pharmacy, the foremost leader of that noble group of pharmaceutical chemists who founded and sustained the Pharmaceutical Society of Great Britain during her infancy and through her subsequent troubles, and the able editor of the Pharmaceutical Journal for 18 years, died on the 12th of June last, in the 49th year of his age. The history of pharmacy in Great Britain during the last twenty years, when it is written faithfully, will show how ceaseless and laborious were the efforts of this extraordinary man in promoting the advancement of every pharmaceutical interest.

Humboldt, Bompland and Robert Brown. — This trio of remarkable savans, whose labors have in various ways made the world their debtor, have paid the greatest debt of nature since our last meeting. As pharmaceutists, as students of the Materia Medica, we have so much to thank them for in view of their botanical contributions, that in common with all the world we render a tribute of acknowledgment.

WILLIAM PROCTER, Jr.,
WM. S. THOMPSON,
WM. A. BREWER,
JOHN JACKSON,
AMBROSE SMITH,
} *Committee.*

REPORT OF THE COMMITTEE ON WEIGHTS AND MEASURES.

THE Committee on Weights and Measures has given the subject referred to it a very careful and deliberate consideration. So grave, however, are the inconveniences attending any important change in the established system, and so varied and complex are the conditions to be fulfilled by any standards and divisions which shall deserve to displace it, that your Committee has with every step of its progress in the investigation felt only an increased sense of the difficulty and responsibility of the task. The general attention given to the question of a reform in weights and measures in all departments of trade, and among almost all classes of men, not only in our own country but in England, sufficiently attests the need that is felt for such reform; while the great diversity of opinion expressed in the discussions flowing out of this agitation, and the number and incongruity of the projects suggested as remedies for the existing evils, equally well attest the intricacy of the mechanism, and the insufficiency of all the schemes thus far proposed for its reorganization.

It appears strange that while our calculations are universally made by a decimal system of arithmetic, (that is, by groupings of ten in a series of ascending orders,) not one of our various tables of weights or measures is based upon this scale, nor has even one of the multitudinous subdivisions of either of them by accident fallen upon the number 10; although almost every other number has been called into requisition, including various fractions.*

* Thus 1½ tierces make 1 hogshead (of wine measure); 2¼ inches make one nail (of cloth measure); 5½ yards, or 16½ feet, make one rod (of land measure); 437½ Troy grains make one ounce avoirdupois; — or 1.0948 oz. Troy are equal to 1 oz. avoirdupois. So incorporating the apothecaries' denominations with the Troy, from which they were derived, we have 1½ scruples make one pennyweight, 2½ pennyweights make one drachm, &c.

By this incongruous and irrational system, we are constantly compelled to resort to compound arithmetic, as it is called, to make the most trivial computations, and not unfrequently must reduce a long series of values to their lowest terms, or rather to a common unit, by a process of multiplication and addition, merely to render arithmetical calculations practicable, and then immediately reconvert the resulting amount to the original form, or to its largest units, by the reverse process of division and subtraction.

Still more strange and embarrassing is it (as though these inconveniences were not sufficient for the popular taste,) that so simple an idea as that of weight must be estimated by distinct standards and divisions, — varying with the substance to be weighed; and that the same terms should thus have come to denote entirely different values. As Mr. Adams has well stated in his valuable Report on Weights and Measures, — "The pound avoirdupois is heavier than the pound Troy; but the ounce avoirdupois is lighter than the ounce Troy. The weights and measures of all the old systems present the perpetual paradox of a whole not equal to all its parts." That these great and glaring inconveniences should have been so long tolerated, would appear surprising, did we not consider the wide extent to which the received denominations are employed, and the extreme difficulty of inducing any large numbers of men to abandon that to which they have been long accustomed, for an untried system, which, whatever its promise of advantage, would necessarily involve considerable additional labor, and much confusion in the attempt to adopt it. Indeed, so all-important is uniformity to the successful working of any system of weights and measures, that it may well be doubted whether any abstract excellence of method would justify the introduction of new scales or standards, unless they offered the prospect of a general adoption. This consideration is sufficient to remind the Committee and this Association that we can take no final action in the matter; that the only proper function of the body in this connection is merely to suggest such improvements as may be deemed expedient; — since only a political sanction can give the authoritative establishment to a code of measures, so vital to its efficient working, and its national acceptance.

Different projects in remedy of the existing and acknowledged evils suggest themselves; some more practicable, others more systematic; and unfortunately these two classes appear to bear an inverse ratio to each other.

The most obvious improvement would be, in the first place, a restriction of all weights and measures to a single scale each, for all purposes; — and in the second place, the substitution of decimal divisions, conformably to our established arithmetical notation. The old names might be retained, but with the new values necessarily derived from the changed proportions of the subdivisions; and this would probably be the simplest and most feasible reform which could be suggested, since all experience shows that, however much more rational it may be to assign new terms to new things or ideas, mankind is ever far more ready to adopt a change of substance than of form, and far more prone to transfer old names to new but analogous uses, than to accept an unfamiliar nomenclature expressly contrived for such new uses.* The following table adapting the received subdivisions and terms of apothecaries' and avoirdupois weights to a decimal scale would be sufficiently similar to the existing system, to probably present no great difficulty to general acceptance:

Decimal Table of Weights.

	1 grain	1 =	(Troy Weight)	1 gr.
10 grains make	1 scruple	10 =		½ scr.
10 scruples "	1 drachm	100 =		1 dr. 2 scr.
10 drachms "	1 ounce	1000 =		2 oz. and 2 scr.
10 ounces "	1 pound	10000 =		1 lb. 8 oz. 6 dr. 2 scr.
10 pounds "	1 stone	100000 =		17 lbs. 4 oz. 2 dr. 2 scr.
10 stones "	1 hund. wt.	1000000 =		173 lbs. 7 oz. 2 dr. 2 scr.
10 hund. wt. "	1 ton	10000000 =		1736 lbs. 1 oz. 2 dr. 2 scr.

*Mr. Adams, speaking of the nomenclature of the French system of measures, remarks: "This is the part of the system which has encountered the most insuperable obstacles in France. The French nation have refused to learn, or to repeat these twelve words. They have been willing to take a total and radical change of things; but they insist upon calling them by old names. They take the metre; but they must call one third part of it a foot. They accept the kilogramme; but instead of pronouncing its name, they choose to call one half of it a pound." — (*Report on Weights and Measures, made to Congress, Feb.* 22, 1821.)

This table, in its divisions at least, has been proposed by various writers who have suggested it, apparently, independently of each other. Considerable differences have however existed among these reformers, as to the standard of weight that should be adopted as the starting point in such a decimal scale. On this important question your Committee feels that too many varied interests are involved, to permit a hasty opinion or any decisive judgment at this time. Unless such a standard can be found as shall ultimately be universally received for all kinds of weight, a change would be productive of more evil than benefit. If we accept the Troy grain as the unit, (and from the great value of this weight in Pharmacy especially, and the vast amount of useful knowledge embodied in it, this would seem to be the one most important to be preserved,) we should have the relative values for each denomination exhibited in the preceding table. By this apportionment the largest weight of the scale, or the new ton, would be about five-eighths of the present ton; or 1428½ lbs. avoirdupois.

A peculiar beauty in the decimal system, in addition to the extreme facility it affords to all arithmetical operations, is the familiar property that it dispenses entirely with "reduction"; all the units contained in any sum whether large or small, being apparent on mere inspection. Thus supposing the value above assigned to the new pound (1 lb. 8 oz. 6 drachms, 2 scruples) were a decimal expression, we might read it at once as 1,862 scruples, or as 186 drachms and 2-10, or as 18 ounces and 62-100, — or as 1 pound and 862-1000, instead of having to make, as now, a special calculation to ascertain each of these results.

The unit of weight above selected as the standard of the table, namely, the Troy grain, appears to us as being, on the whole, preferable to any other of those now in use; but there are no doubt many who would regard the present pound as the most important for preservation and comparison. Accepting this, we should have the following table of relative values: —

Decimal Standard the Avoirdupois Pound.

1 grain	0. 7 gr.	=	(Avoirdupois Weight.)	0.0256	dr.
1 scruple	7 grs.	=		0.256	"
1 drachm	70 "	=		2.56	"
1 ounce	700 "	=	1 oz.	9.6	"
1 pound	7000 "	=	1 lb.		
1 stone	70000 "	=	10 lbs.		
1 hund. wt.	700000 "	=	3 qrs. 16 lbs.		
1 ton	7000000 "	=	8 cwt. 3 qrs. 20 lbs.		

We have unfortunately no standards of weight in nature, and are therefore compelled always to refer ultimately to some unit of length, in determining or verifying the value of our measure of the former. Thus the standard unit of weight in this country, copied from that of Great Britain, is the Troy pound,* which is defined as the weight of 22.794422 cubic inches of distilled water at its maximum density (temperature 39.83 degrees Fahrenheit,†) barometer standing at 30 inches; the inch of this measurement being derived from the length of a pendulum vibrating seconds in a vacuum, at the level of the sea, — in Greenwich or London. Such a pendulum is divided into 39.1393 inches.

Conformably to this system of decimal subdivision, the table of measures of capacity (dry and liquid) might be regulated as follows, the standard unit being the ordinary pint of the United States.

* The ancient standard of weight in England was the grain, — so called from being measured by the weight of a thoroughly dried grain of wheat, taken from the middle of the ear. The old silver penny was made to weigh 32 such grains, — hence called the penny-weight, the unit of the Tower pound. This new unit of weight was subsequently divided into 24 equal parts, still called grains; which increased value has ever since been retained and known as "Troy weight."

† The temperature at which water is heaviest (or most contracted) is now pretty well ascertained to be much nearer 39° F. than 40° F., the number commonly assigned. In a paper by James P. Joule, and Dr. Lyon Playfair, published in the "*Lond. Ed. and Dubl. Phil. Mag.*," for Jan., 1847, (vol. 30, p. 41.) 39°. 1 Fahr. is given as a mean result of a series of very careful experiments, for the maximum density of water, and as not probably in error the hundredth part of a degree.

Decimal Table of Measures. (Capacity.)

	1 minim	=	0.768 ℥.
10 minims make	1 scruple	=	7.68 ℥.
10 scruples "	1 drachm	=	1 dr. 16.8 ℥.
10 drachms "	1 gill	=	1 oz. 4 dr. 48 ℥.
10 gills "	1 pint	=	(Wine Measure) 1 pint.
10 pints "	1 gallon,	=	1 gall. 1 quart.
10 gallons "	1 firkin,	=	12 galls. 2 quarts.
10 firkins "	1 butt,	=	125 galls. (or 1 butt nearly.)

This scale would be quite sufficient for measuring either liquid or solid bulks, and would advantageously replace the separate and double scales in common use; for since the only idea involved in either liquid or dry measure, is simply that of volume, there is no good reason for modifying the designation of the measure by the varying nature of the substance measured. If a "pint" may express indifferently a measure of table salt or of milk — of sand or of alcohol — equally well may either be measured by a "gallon" or by a "peck." By the United States standard, the "pint" is 28.875 cubic inches, or the gallon 231 cubic inches, which is equal to 58,372.1754 grains of distilled water, at its maximum density, — the barometer 30.

While the Committee is clearly of opinion that measures of capacity are entirely too important and useful to be abolished — as has been recommended by some, the persuasion is equally strong that determination by weight would be advantageously applied to the measure of many articles at present usually determined by volume.

As both weights and measures are necessarily referred to units of length for their standards, it is evidently a very important matter, in all projects for their revision, that the linear scale should be well determined, and its values accurately established. A reform in measures of length is no less needed than in those of weight and capacity; and all are so connected, that the work of amendment, to be complete and efficient, should embrace all, commencing with the table of "long measure," as it is called, as the great starting point.

Even so early in our national existence as the year 1790, the illustrious Jefferson, then Secretary of State, in obedience to a resolution of Congress calling upon the Secretary to propose a plan or plans for establishing uniformity in the currency, weights, and measures of the United States, presented a report recommending a decimal system of metrology, and its derivation from a natural and permanent standard of length.

We think Mr. Jefferson's Report possesses sufficient interest to justify a copious extract; and regarding his decimal project as one of considerable merit, we shall present his tables entire.

"To obtain uniformity in measures, weights, and coins, it is necessary to find some measure of invariable length, with which as a standard, they may be compared. There exists not in nature, as far as has been hitherto observed, a single subject or species of subject accessible to man, which presents one constant and uniform dimension. The globe of the earth itself indeed might be considered as invariable in all its dimensions, and that its circumference would furnish an invariable measure; but no one of its circles, great or small, is accessible to admeasurement through all its parts, and the various trials to measure definite portions of them, have been of such various result as to show there is no dependence on that operation for certainty. Matter, then, by its mere extension furnishing nothing invariable, its motion is the only remaining resource."

Mr. Jefferson then refers to a mean solar rotation of the earth, as furnishing us through the second's pendulum, with a measure of length convenient and reliable, and accessible to every one. He acknowledges that "even the pendulum is not without its uncertainties, and he alludes to the difficulty of its precise determination, as well as the variations in its measure arising from differences of latitude, altitude, barometric and thermometric conditions, and lastly the disturbance of the driving mechanism (in the case of an attached pendulum) — impossible to be exactly determined. He recommends the latitude of forty-five degrees, then recently proposed in Europe as a suitable point, and the mean temperature of the year at that location.

Instead, however, of taking the ordinary pendulum of 39 inches, he proposes the second's rod of 5 feet, then generally known as Leslie's pendulum rod. A simple straight rod without the bob or ball, suspended at one end, has, as is well known, its centre of oscillation at a distance of two-thirds of its length from its point of suspension; or, in other words, is one half longer than the common loaded pendulum vibrating in the same time. Such a rod vibrating seconds, is 58.72 inches.

"Let the standard of measure, then, be a uniform, cylindrical rod of iron, of such length as in latitude 45°, at the level of the ocean, and in a cellar or other place, the temperature of which does not vary through the year, shall perform its vibrations in small and equal arcs in one second of time. A standard of invariable length being thus obtained, we may proceed to identify by that, the measures, weights, and coins of the United States. But here a doubt presents itself as to the extent of the reformation meditated by the House of Representatives. The experiment made by Congress in the year 1786, by declaring that there should be one money of account and payment through the United States, and that its parts and multiples should be in a decimal ratio, has obtained such general approbation both at home and abroad, that nothing seems wanting but the actual coinage to banish the discordant pounds, shillings, pence and farthings of the different States, and to establish in their stead the new denominations. Is it in contemplation with the House of Representatives to extend a like improvement to our measures and weights, and to arrange them also in a decimal ratio? The facility which this would introduce into the vulgar arithmetic, would unquestionably, be soon and sensibly felt by the whole mass of the people, who would thereby be enabled to compute for themselves whatever they should have occasion to buy, to sell, or to measure; which the present complicated and difficult ratios place beyond their computation for the most part. Or, is it the opinion of the Representatives that the difficulty of changing the established habits of a whole nation opposes an insuperable bar to this improvement? Under this uncertainty the Secretary of State thinks it his duty to submit alternative

plans, that the House may at their will adopt either the one or the other, exclusively, or the one for the present, and the other for a future time, when the public mind may be supposed to have become familiarized to it."

The first plan proposes to retain the existing measures, referring them merely to the uniform natural standard. "Let the standard rod (of 45°) be divided into 587½ equal parts, and each declared to be a line;—10 lines an inch, 12 inches a foot," &c. In the table of measures of capacity, no change is suggested, except "to fix the gallon to one determinate capacity, as the unit of measure — both wet and dry: for convenience is in favor of abolishing the distinction between wet and dry measures." As a convenient compromise for the gallon, 270 cubic inches is proposed as its measure. In the table of weights, he remarks, "it would be convenient to suppress the pound and ounce Troy, and the drachm and quarter avoirdupois; and to form into one series the avoirdupois pound and ounce, and the Troy pennyweight and grain." Dividing the avoirdupois ounce into 18 pennyweights, the new pennyweight would contain between a third and a quarter of a grain more than the present. The standard of weight proposed, is that of a cubic tenth of a foot, (or the thousandth part of a cubic foot) of rain water, to determine and constitute the ounce.

Mr. Jefferson's second plan — (supposing a more thorough reformation is contemplated,) advocates a decimal division of all measures. "The unit of [linear] measure is still that which must give law through the whole system; and from whatever unit we set out, the coincidences between the old and new ratios will be rare. All that can be done will be to choose such a unit as will produce the most of these. In this respect, the seconds' rod has been found on trial to be far preferable to the seconds' pendulum."

Assuming, then, Leslie's seconds' rod of 58.72368 inches as his standard, and dividing it into five equal parts, Mr. Jefferson takes this fifth part, or 11.744736 inches as the length of the new "foot." From this is derived the following table:—

Decimal Table of Long Measure.

	1 point	=	.011 in.	
10 points make	1 line	=	.117 in.	
10 lines "	1 inch	=	1.174 ins.	
10 inches "	1 foot	=	11.744736 ins.	($\frac{47}{48}$ foot.)
10 feet "	1 decad	=	9.787 feet.	
10 decads "	1 rood	=	97.872 "	
10 roods "	1 furlong	=	978.728 "	($1\frac{1}{3}$ furlongs.)
10 furlongs "	1 mile	=	9787.28 "	($1\frac{9}{7}$ miles.)

The proposed measures of capacity are derived from the cube of the new "foot;" this cubic "foot" (containing 1620 cubic inches,) the standard "bushel" — being about one fourth less than the then medium English bushel. The table is as follows: —

Decimal Table of Capacity Measure.

	1 meter	= 1	cubic inch (n. s.) or 1.62 cub. in.
10 meters make	1 demi-pint	= 2 × 2 × $2\frac{1}{2}$ ins. (n. s.)	or 16.2 cub. in.
10 demi-pints "	1 pottle	= 5 × 5 × 4 ins. (n. s.)	or 162. cub. in.
10 pottles "	1 bushel	= 10 × 10 × 10 ins. (n. s.)	
10 bushels "	1 quarter	= 9.375 cubic feet.	
10 quarters "	1 last	= 93.753 cubic feet.	

This table is intended for both liquid and dry measure. The "pottle" is about one sixth more than the English measure of that name. The "quarter" is about one fifth less, and the "last" about one seventh more than the English.

The standard of weight is derived from the preceding measures, by taking one cubic "inch" (n. s.) or one "meter" of rain water, to be called the "ounce" (n. s.) Its weight is $\frac{5}{8}$ oz. Troy, or $\frac{1}{10}$ oz. avoirdupois. The following is the table:—

Decimal Table of Weights.

		1 mite	= .041	grains Troy.
10 mites	make	1 minim	= .4101	"
10 minims	"	1 carat	= 4.101	"
10 carats	"	1 double-scruple	= 41.017	"
10 double-scruples	"	1 ounce	= 410.17	"
10 ounces	"	1 pound	= .5859 lb. av.	($\frac{3}{4}$ lb. tr.)
10 pounds	"	1 stone	= 5.8595 lbs.	"
10 stones	"	1 kental	= 58.5957 "	"
10 kentals	"	1 hogshead	= 585.9574 "	"

When we reflect that the system of metrology here displayed was perfected by Mr. Jefferson before any steps had been taken by the French government toward the decimal re-organization of weights and measures in that country, we must regard it as a memorial in the highest degree creditable to the judgment and contriving skill of its author; and as one of many illustrations of the varied activity of his mind, and of the interest he ever felt in all schemes for human improvement. The great superiority of his proposed scales of measure, to those in common use, cannot be questioned; and their adoption would have been a real and signal public benefit. The tables above presented, form a connected and complete system, each depending directly upon the one preceding, and necessarily flowing out of it, and all determined from a single and invariable natural standard by a very simple and beautiful mode of derivation.

In this respect however, the French system is by far the best of all that have yet been devised. Starting with a carefully measured quadrant of the earth's meridian, and dividing it into 10 million parts, this system presents us with a "metre"* as a universal standard to which all others may be referred. Indeed, if a decimal system of weights and measures is to be ultimately adopted, there appears to be none that has such just claims to our acceptance as that of the French; and although it would be much more difficult of popular introduction than a simple decimalization of our own divisions, as previously indicated, and therefore less "practicable," your Committee does not hesitate to express the opinion that it would be in every way superior, both in regard to the precision of its measures, and the simple and philosophical character of its divisions; besides all which it has the immense advantage of being already introduced and in successful practical operation throughout the great empire of France; and every extension of its use would be an important step in the progress toward a uniform system among all nations.†

* Equal to 39.370788 inches; very nearly the length of the second's pendulum, and not much longer than our yard.

† In the Report made by Prof. A. D. Bache, Superintendent of Weights and Measures, to the Secretary of the Treasury, Dec. 30, 1856, it is stated that the French metrical system "has extended widely beyond the boundaries of France, and has been adopted by law in Spain, Belgium, Greece, Holland, Lombardy, Poland, and Switzerland, in Europe, — and Chili and Mexico, on this continent." (Page 87.)

The scales of length, measure, and weight, with their respective values, may as well be here presented:

French Table of Lengths.

	1 *millimetre*			0.03937 in.
10 *millimetres*	= 1 *centimetre*			0.39370 in.
10 *centimetres*	= 1 *decimetre*			3.93707 ins.
10 *decimetres*	= 1 METRE		1 yd.	3.37079 "
10 METRES	= 1 decametre		10 yds. 2 ft.	9.7078 "
10 decametres	= 1 hectometre		109 yds. 1 ft.	1.0788 "
10 hectometres	= 1 kilometre		1093 yds. 1 ft.	10.788 "
10 kilometres	= 1 myriametre	6 miles	376 yds.	11.88 "

The unit of capacity is derived from the tenth part of the METRE, being the cubic *decimetre*, and is called a LITRE. This gives the following scale of values:

French Table of Measures. (Capacity.)

	1 *millilitre*			16.2318 ℔.
10 *millilitres*	= 1 *centilitre*		2 drs.	42.3180 ℔.
10 *centilitres*	= 1 *decilitre*		3 oz. 3 drs.	3.168 ℔.
10 *decilitres*	= 1 LITRE		2 pts. 1 oz. 6 drs.	31.68 ℔.
10 LITRES	= 1 decalitre	2 galls.	5 pts. 2 oz. 1 dr.	18.336 ℔.
10 decalitres	= 1 hectolitre	26 galls.	3 pts. 5 oz. 5 drs.	3.36 ℔.
10 hectolitres	= 1 kilolitre	264 galls.	1 pt. 8 oz. 2 drs.	33.6 ℔.
10 kilolitres	= 1 myrialitre	2641 galls.	7 pts. 3 oz. 1 dr.	36 ℔.

The unit of weight, is one *millilitre* (a cubic *centimetre*) of distilled water, in a vacuum, at its maximum density, (39° Fahr.) This unit of weight is called the GRAMME, giving the following scale:

French Table of Weights.

	1 *milligramme*			0.0154 grs.
10 *milligrammes*	= 1 *centigramme*			0.1543 grs.
10 *centigrammes*	= 1 *decigramme*			1.5434 grs.
10 *decigrammes*	= 1 GRAMME			15.434 grs.
10 GRAMMES	= 1 decagramme		2 dr. 1 scr.	14.3 grs.
10 decagrammes	= 1 hectogramme		3 oz. 1 dr. 2 scr.	3.4 grs.
10 hectogrammes	= 1 kilogramme	2 lbs.	8 oz. 1 dr.	14. grs.
10 kilogrammes	= 1 myriagramme,	26 lbs.	9 oz. 4 dr. 1 scr.	

Beautiful and simple as this system appears, and clear as its nomenclature is to those familiar with the Greek and Latin tongues, it is yet open to animadversion on practical grounds, in that its language is that of the philosopher, and not of the tradesman or the business man. To all but classical scholars — that is, to the large majority of men, — the terms used in all the above tables are difficult and unmeaning; to be acquired and appreciated only by a laborious effort of abstract memory, and even when thus acquired, constantly liable to be confounded and mistaken. Its metres and litres, its myriametres and myrialitres, its decigrammes and decagrammes, are admirably contrived to bewilder the uninitiated, but of all possible devices are the least adapted to the common uses of daily life. To obtain a ready and direct apprehension of the values of different denominations of measure, it is necessary that each should be recognized as an independent unit, without any reference to its fractional or multiple derivation. Thus, "ounces" or "inches" are at once seized upon by the mind as distinctive standards of value; and the fact that these terms both signify "twelfths" (being derived from the Latin "uncia") never enters into our contemplation when using them. The coin a "cent" has come to signify a "one" and not a "hundredth." What is really needed then for the popular service, is a set of names, brief, easy, and distinctive by a wide separation of sound, however arbitrary or unmeaning may be their origin. In this view of the matter, the rude and indefinite vulgarisms of "grains" and "scruples," "feet" and "rods," "gills" and "gallons," are infinitely preferable to the scientific jargon of *centigrammes* and *milligrammes*, and *hectogrammes* and *kilogrammes*. In fact, the French system has totally ignored all units, excepting the single one selected as the standard for each table. Thus in weight, the French cannot be said to have any other measure than the gramme; and instead of resorting to the dead languages for so familiar a thing as a simple numeration table, it would be much better to speak of and write down, the multiples or divisions of this weight as a thousand or a hundred grammes, or as so many hundredths or thousandths of a gramme. This, in plain English (or

plain French) would be understood by every one, and would just as conveniently express every thing that is contained in the high sounding terms we have characterized as "scientific jargon."* Should these measures be therefore introduced, we should strongly urge the entire abolition of the French nomenclature, and the complete naturalization of the different scales by the substitution of more familiar terms from our vernacular tongue. This is precisely what has been done in Holland, which has adopted the French measures entire, since 1817, but has applied to them the old and native designations of the country, — the English apothecaries' weight being, however, still retained. In Belgium, also, the same method has been pursued.

A practical defect in the working of this system which has been demonstrated by experience, is its incapability of binary divisions; a defect which of course attaches equally to every decimal scale; and one which has always strikingly displayed itself wherever this scale has been brought into popular use, either for the estimation of lengths, bulks, weights or values. In our own country the decimal scale has been applied only to the currency, and we find that in spite of the legal division of the *dollar* into tenths, and its seeming establishment by the coinage and circulation of *dimes*, — the people persist in cutting it up into quarters, eighths, sixteenths, and even thirty-seconds, to the utter neglect of the coins actually established by law, and to the inconvenience, confusion, and loss, resulting from the necessary involvement of interminable and unmanageable fractions. And yet in every department of trade, the current prices are derived exclusively from this process of successive halv-

* While thus strongly expressing our objection to the *nomenclature* of the French tables, (whose very fault is its excess of system,) it would be unjust not to acknowledge, and ungenerous not to admire, the catholic sentiment which dictated it. The eminent philosophers to whom belongs the honor of developing a metrology by far the most perfect that has yet been devised, felt as if they were legislating for the civilized world. Desirous that all might have the benefit of their labors, they rejected all the familiar terms employed in France, and naturally resorted to the great storehouse from which the scientific world has ever been accustomed to draw its technical phraseology; exhibiting in this, their anxiety to adopt a language which might be acceptable to all nations. Unfortunately, it is suited to none. The language of science cannot be that of the shop and the market-place.

ing, never from the process of tithing as ordained and defined by law. The modern coinage of the thirty-second of a dollar, — a three-cent piece, a coin "without a name" as it is without a place in any decimal scale, — may be regarded as a feeble and imperfect recognition by law of the insufficiency of our much admired and boasted decimalization of moneys to meet the actual wants and necessities of trade and daily business life.

Many have supposed that this is all a matter of practical indifference, and that it merely requires the decisive sanction of legislative authority to accustom a people to any set of subdivisions. Such an opinion, however, exhibits both a blindness to the lessons of all experience, and an inattention to many of the most important and subtle theoretical considerations affecting the relations of value and our apprehension thereof.

Binal progression may be regarded as preëminently the natural scale of division. This fundamental fact is indeed illustrated in the very origin of the word *division*. The binary scale is in the first place the lowest and simplest of all the geometrical progressions. It is that of which we have the most ready and precise conception; indeed, it may be said to be the only one of which we have any accurate appreciation beyond the second or third term.* It is that by which we most rapidly and nearly approach any vague quantity we may desire to employ; hence its universal use in trade. It is that which in any system of independent units of measure (as in weights, or coins) furnishes us with the means of representing the greatest range of particular values, by the smallest number of pieces. It is that which affords us the easiest practical measure; thus we can fold a string, a sheet of paper, or any other flexible material, or we can cut an apple, or a loaf of bread, at once and with great precision into halves, quarters, and eighths, while we should have to make repeated trials to divide the same into thirds or fifths, and then attain the result only tentatively and approximately. And lastly, it appears to be the most natural of scales,

* Thus, 1, 2, 4, 8, 16, 32, 64, &c., can be readily apprehended as repeated doublings, — while 1, 3, 9, 27, 81, &c., leave the mind confused in the attempt to follow up successive triplings.

from the very common use of the two hands in separating objects into pairs.*

Such being the claims then, of the binary scale of geometrical progression, and such its obvious advantages over all others, it is not surprising that this should be found to be practically the prevalent mode of distributing the more common weights and measures throughout the world, whatever may be the multiples or divisions enacted by law.

The Roman weights, in general use throughout the empire (that is, throughout the civilized world) for some centuries after the Christian era, were, by means of intermediate subdivisions (introduced by the common consent of traders) practically distributed upon a binary scale. The smallest weight was the *lens* or *primus* (equal to about three quarters of a Troy grain) of which 18 made one *quadrans*, (the quarter drachm); 2 of these made 1 *dimidium*, (half-drachm); 2 of these made 1 *drachma*, (very nearly our drachm); 2 drachmæ made 1 *sicilicus* or *siclus*; 2 of these made 1 *semiuncia* or *assarius*; and 2 of these made 1 *uncia*, the twelfth part of the *libra* or pound. So with the divisions in universal use at the present day; we find that a nest of avoirdupois weights comprises ¼ oz., ½ oz., 1 oz., 2 oz., 4 oz., 8 oz., and 16 oz., or 1 pound, and sometimes a 2 pound weight, and a 4 pound weight; and by this scale of binal progression or division, almost everything is purchased at retail.† Our yardsticks are found to be

* "The classification by pairs which nature points out would suggest the simplest mode of reckoning. Counting these pairs again by two, and repeating the procedure, we arrive by progressive steps at the radical terms, 4, 8, 16, &c." (*Edinburgh Review*, for May, 1811, vol. 18, page 185.)

The celebrated Leibnitz, so eminent as a mathematician as well as a philosopher, struck with the simplicity and peculiar capabilities of this scale, proposed and strongly urged the introduction of Binary Arithmetic. He showed that the Binary system, in addition to its extreme facility, possessed peculiar value in discovering the properties of numbers, and in constructing tables, &c. He did not, however, recommend it for general use, from the increased number of figures required to express ordinary amounts.

† Mr. Adams in his Report, speaking of the old and new measures of capacity in France, remarks:—"The most easy and natural divisions of liquids are in continual halvings; and the Paris pint was thus divided into halves, quarters, eighths, sixteenths, and thirty-second parts, by the name of chopines, half-setiers, possons, half-possons, and roquilles. The half-setier, just equivalent to our half-pint, was the measure in most common use for supplying the daily necessities of the poor; and thus the decimal divisions of the law became snares to the honesty of the seller, and cheats upon the wants of the buyer." (*Report on Weights and Measures.*)

divided not into the legal feet and inches, but into halves, quarters, eighths and sixteenths. Precisely so with the inch, which is never divided into its primitive "three barley corns," but almost always, like the yard, by the binal scale, into eighths and sixteenths, though occasionally divided for particular purposes into twelfths, or into tenths. The operation of this great law is quite as strikingly exhibited in France, where the popular necessities have compelled the introduction of binal divisions, not recognized by the established decimal scales, nor, indeed, strictly compatible therewith.*

Mr. Peacock, in his admirable treatise on "Arithmetic," in the *Encyclopedia Metropolitana*, thus sums up his review of the French system. "The decimal subdivision of these measures possessed many advantages on the score of uniformity, and was calculated to simplify, in a very extraordinary degree, the arithmetic of concrete quantities. It was attended, however, by the sacrifice of all the practical advantages which attend subdivisions by a scale admitting of more than one bisection, which was the

* "The supreme law of the land was made to bend before the will of the people, and after a vacillating legislation, an imperial decree was issued in 1812, which while it retained the *units* of the new weights and measures, allowed them to be divided by other than decimal numbers. Thus gradually were the old names reintroduced and applied to measures and weights to which they never before belonged. For retail sales of all articles which are sold by weight, the shopmen were allowed to employ the following usual weights. The pound (livre) equal to half a kilogramme, or 500 grammes, which shall be divided into 16 ounces. The ounce (once) or one-sixteenth part of the pound, which shall be divided into eight gros. The gros, or one-eighth part of the ounce shall be divided into halves, quarters and eighths. They shall bear with their appropriate names the indication of their weight in grammes." (*Journal of Pharmacy for October*, 1830, vol. 2. Page 201. Article on "Weights and Measures," by Dr. B. Ellis.)

This decree of 1812, was, however, in 1840 revoked; and the "Systeme Usuel" has since then been interdicted by law, under penalties; the decimal metrology being alone permitted, and strictly enforced. The practical working of the system, however, during the last twenty years, has but furnished another illustration to the oft-cited apophthegm of Horace:

"Naturam expellas furca, tamen usque recurrit."

Binary divisions, as we are informed, are still common in trade, either in the open guise of fractions, or in the form of higher multiples of lower units. On turning over a file of the *Moniteur Universel* (a daily paper of Paris,) for the year 1852, we find the prices in the money market constantly interpolated with quarters and eighths. Thus in the number for Dec. 30th, 1852, we have in the list of prices on the last page, quotations of 98⅛ francs; 98¼ francs; 43¾ francs; &c.

case with those previously in use; *and it may well be doubted whether the loss in this respect was not more than a compensation for every other gain.*" Such a statement from one who has given the whole subject so careful a study, certainly deserves our most serious consideration.

The masterly and comprehensive report on the subject of weights and measures, made to Congress in 1821, by Mr. Adams, when Secretary of State, contains the following judgment: "The experience of France has proved that binary, ternary, duodecimal, and sexagesimal divisions are as necessary to the practical use of weights and measures, as the decimal divisions are convenient for calculations resulting from them; and that no plan for introducing the latter, can dispense with the continued use of the former. . . . . From the verdict of experience, therefore, it is doubtful whether the advantage to be obtained by any attempt to apply decimal arithmetic to weights and measures, would ever compensate for the increase of diversity which is the unavoidable consequence of change. Nature has no partialities for the number ten; and the attempt to shackle her freedom with them will for ever prove abortive."

So in the interesting paper of Dr. Ellis, (in the *American Journal of Pharmacy*, vol. 2, page 202,) the French decimal system is thus referred to: "Every one is struck, at the first glance of this system, with the beautiful simplicity which it derives from decimal arithmetic. It appears, however, to have been overlooked, that, although decimal arithmetic is admirably designed to facilitate the calculation of mere number, it is not equally well suited to the divisions of material things."

Much to the same effect has been the result of the commission appointed lately in England to consider the subject of a decimal coinage. The commissioners, after a full discussion and investigation of the subject, have very recently reported against any change; their report being drawn up in the form of a series of twelve resolutions. The seventh resolution is as follows: "That as regards the comparative convenience of our present coinage, and of the pound and mill scheme, for the reckonings of the shop

and the market, and for mental calculations generally, the superiority rests with the present system, in consequence, principally, of the more convenient divisibility of 4, 12 and 20, as compared with 10, and the facility for a successive division by 2, that is, for repeated halving, in correspondence with the natural and necessary tendency to this mode of subdividing all material things; and with the prevalence of binary steps in the division of our weights and measures."

In the view, then, of this pervading law or principle of all human metrology, so well established, and so distinctly recognized, it becomes an obvious necessity, in adopting a decimal scale, to engraft upon it, the divisions of halves and quarters, at least, (and in the case of the more commonly employed units,—of eighths,) if we would adapt it to the demands of the people, or if we would hope for its permanent establishment. It is true that this would involve a considerable number of subordinate divisions between one denomination of measure and the next below it, as it would be requisite to have separate and distinctive weights, for instance, for the unit, (whatever it might be,) for one and a quarter of the unit; for two, for two and a half, and for five; and it is also true, that the fractional values thus introduced would not be directly referable to the ordinary computations of decimal arithmetic,—thus adding, somewhat, to the complexity and trouble of otherwise very simple calculations; but this is a fault, not of the binary divisions themselves, but resulting from a radical and incurable defect in the decimal system. So long as we continue to count, to add, subtract, multiply, and divide by tens, so long must we submit to this inconvenience, (undoubtedly a serious one,) or we must choose the greater evil of abandoning all attempts at uniformity and consistency of system, and continue, as heretofore, to measure and to weigh by heterogeneous tables, while we perform the necessary operations of comparing, compounding, and distributing these values, by a method or ratio entirely dissimilar; entailing upon ourselves the waste of time, labor and patience, consequent upon a petty scheme of eternal and superfluous reductions.*

* "Perhaps it may be found by more protracted and multiplied experience, that this is the only 'uniformity' attainable by a system of weights and measures for universal

This horn of the dilemma is that which has been accepted by the coinage commission of England, to which a reference has just been made. The eleventh resolution of the Commissioners' Report, is: "That the advantages in calculation and account-keeping, anticipated from a decimal coinage, may, to a great extent, be obtained without any disturbance of our present coinage, by a more extensive adoption of the practice now in use at the National Debt Office, and in the principal assurance offices; viz., of reducing money to decimals, performing the required calculations in decimals, and then restoring the result to the present notation." With our experience of a decimal coinage, (notwithstanding its imperfections,) this is not the horn likely to be selected by Americans in attempting a reform in weights and measures.

An expedient has been suggested by some, for facilitating division in decimal notation, which is ingenious, and deserves a notice. The project is to adopt a uniformly decimal system of weights and measures, but to estimate entirely by "cents," — by simply suppressing every alternate denomination; thus, while reckoning decimally, we should traffic only centesimally. Our practical application of this method in all our money transactions, in which dimes are entirely suppressed in the market, (though still having their place in the columns of the ledger,) and our estimates made in *dollars* and *cents*, familiarizes our minds to the process, and enables us to see how such a system might be indefinitely extended, by the simple device of counting by double places of figures. The French table of weights would stand thus:

100 deci-milligrammes	make	1 centigramme.
100 centigrammes	"	1 gramme.
100 grammes	"	1 hectogramme.
100 hectogrammes	"	1 myriagramme.

This suppression of the alternate denominations would have the advantage of abolishing the very objectionable terms *decigramme*

use: that the same material instruments shall be divisible decimally for calculations and accounts; but in any other manner suited to convenience in the shops and markets; that their appropriate legal denominations shall be used for computation, and the trivial names for actual weight or mensuration." (*Adams's Report.*)

and *decagramme*. Instead of the extreme awkwardness of taking one quarter of a gramme (2½ decigrammes,) we are furnished with the value in whole units, by taking twenty-five centigrammes.

Simple and taking as this proposal is, it is, in our opinion, not free from serious objections. It, in fact, complicates rather than simplifies, by giving a very wide range for estimating values. While it thus multiplies the units, and enlarges the interval between them tenfold, — it only furnishes us with a *single* additional bisection, namely, the quartering. An eighth would still require a fractional expression. Its benefit, therefore, bears no proportion to the increased trouble and confusion involved. The necessity universally felt for quarternal and octaval divisions, would infallibly operate here as it has in our currency; and we should constantly hear of 37½ hundredths of a pound; 62½ hundredths of a pint; &c., which would be, in no respect, better than 3¾, or 6¼ tenths. The truth is, we need more frequent denominations than decimal ones, rather than more distant stepping-stones; and for some purposes, even the binary ratio of progression is not too slow. In looking over the various tables of weight and measure prevailing throughout Europe, it will be found that a large majority of the factors are 2, 4, and 8, with occasional resort to 3 and 6, — the number 4 being, perhaps, the favorite number for the more customary denominations.*

In the course of this investigation, the Committee has been constantly impressed with the inseparable nature of the various branches of a metrical system; and with a consequent conviction of the impossibility of giving that exclusive and confined attention to the weights and measures of our own particular profession, which was probably intended in the appointment of the commission. We have felt, more and more, the necessity of a conformity among all the measures of trade and commerce, and of the reference of all to common laws, and to a single standard. We find that many of the evils that are experienced by us, are those pre-

* This is rendered very apparent on turning over the pages of Woolhouse's little work on the "Weights and Measures of all Nations." No. 101, of Weale's Rudimentary Series. Time does not permit the reference to examples.

vailing in all departments; that no improvements or reforms can be either efficient or enduring, which do not look to the welfare of the whole; and that the agitation of the subject carries with it consequences of far wider scope, and of more momentous interest than most of us had probably conceived. The empiric may be satisfied to alleviate, temporarily, some prominent or more distressing symptom; it is the province of the scientific practitioner to search into the origin of the malady, and to so administer to the real sources of the grievance, as may effect a thorough cure. We doubt, therefore, whether we are at present in a condition to do more than indicate what we regard as the most desirable objects and directions of reform; contributing our share of labor and consideration toward perfecting the great and wide-spread project of improvement, and leaving to those who can most efficiently act in the matter, to further or to better our suggestions.

Entertaining this feeling upon the subject, we are not prepared to fully approve the recent action of the British Colleges engaged upon the revision of the Pharmacopœia, in changing merely the scale by which medicinal preparations are to be dispensed. Discarding the Troy weights, and dividing the avoirdupois pound into 7680 parts, to be called grains, they have presented us with the following table:

British Pharmaceutical Table of Weights.

	1 grain,	or	1 gr. =		0.911458 Troy gr.
20 grains make	1 scruple,	"	20 grs. =		0 911 scruple.
3 scruples "	1 drachm,	"	60 " =		2 scr. 14.6875 grs.
8 drachms "	1 ounce,	"	480 " =		7 drs. 0 scr. 17½ "
16 ounces "	1 pound	"	7680 " =		1 lb. 2 oz. 4 dr. 2 scr.

While we recognize this scheme of division as a decided improvement upon the present anomalous Troy scale, we do not think it worth the sacrifice involved, nor do we see in it the qualities likely to give it a permanency of continuance, or a generality of acceptance. The Troy grain is a standard so widely used, and in medicine especially, is one of so great value, as the exponent of so much knowledge and experience, that it should not be lightly set

aside; and before we incur the greatly increased labor, inconvenience, and confusion, necessarily attendant upon the transition, we should well consider whether we have attained all the benefit within our reach, or whether, at no greater cost, we might not reap the advantages of a far more perfect system.

Amid the conflicting claims of the numerous plans proposed for simplifying and uniting our incongruous metrology (of which only a few of the leading ones have been adverted to,) there appears, at first sight, so much of irreconcilable contrariety, that it might be concluded that a combination of the respective advantages contemplated was hopeless and impossible; and that we were only left to a choice of evils. A more careful scrutiny will, however, as we believe, discover a philosophy in these very discrepancies, and furnish us with the elements of a practicable concord. On the one side, the convenience of a system of divisions or multiples conforming exactly to that by which we are compelled to perform all arithmetical operations, is so obvious, and so universally recognized,* that the advocates of an entire decimalization are certainly justified in their zeal. On the other hand, the necessity of binal progression and division, though not so generally acknowledged, is by all who have given the subject a careful study, so fully appreciated, as being, at least, as fundamental as that of the decimal scale, that those who urge the retention of all such denominations as are measured by the powers of 2, are no less justified. Which policy must, then, be sacrificed?

"The elementary principle of decimal arithmetic," says Mr. Adams, "is supplied by nature to man within himself, in the number of his fingers. Whatever standard of linear measure he may assume in order to measure the surface or the solid, it will be natural to him to stop in the process of addition, when he has counted the tale equal to that of his fingers. . . . . But while decimal arithmetic, thus for the purposes of computation, shoots spon-

* "The great improvement of having but one arithmetical scale for reckoning integers and fractions of every kind, ... is one so obvious, and, withal, so little difficult, that it is a matter of surprise that it should not have been attempted till near a thousand years after decimal arithmetic itself was first introduced into Europe." (*Edinburgh Review, for January*, 1807, volume 9, page 373.)

taneously from the nature of man and of things, it is not equally adapted to the numeration, the multiplication, or the division of material substances, either in his own person, or in external nature. The proportions of the human body, and of its members, are in other than decimal numbers. The first unit of measures for the use of the hand, is the cubit, or extent from the tip of the elbow to the end of the middle finger; the motives for choosing which are, that it presents more definite terminations at both ends, than any of the other superior limbs, and gives a measure easily handled and carried about the person. By doubling this measure, is given the *ell*, or arm, including the hand and half the width of the body, to the middle of the breast; and by doubling that, the *fathom*, or extent from the extremity of one middle finger to that of the other, with expanded arms, — an exact equivalent to the stature of man, or extension from the crown of the head to the sole of the foot. For subdivisions, and smaller measures, the *span* is found equal to half the cubit, the *palm* to one-third of the span, and the *finger* to one-fourth of the palm. The *cubit* is thus for the mensuration of matter, naturally divided into 24 equal parts, with subdivisions of which 2, 3, and 4, are the factors; while for the mensuration of distance, the foot will be found equal to one-fifth of the pace, and one-sixth of the fathom." (*Report to the Senate and House of Representatives, Feb.* 22, 1821, *on Weights and Measures.*)

"The fingers," says Dr. Lardner, "were naturally the first objects which presented to the mind the idea of number; and they furnished, also, a set of natural counters by which the number of things might be marked and expressed. The fingers, being continually in view, familiarized the mind with the contemplation of every number of objects not exceeding ten. It was natural, therefore, that ten should be adopted as the number of objects to form the first group. . . . . Although ten has been so generally adopted as the *radix* of systems of numeration, as to leave no doubt of its origin, yet it is not the only one which has been used, nor is it the only radix having a natural origin. The fingers of one hand rendered the number five familiar to the mind, before the conception of ten as a distinct number presented itself. It

was even more natural and obvious, that the fingers should be contemplated as two groups of five, than as a single group of ten." (*Treatise on Arithmetic*, book i, chap. 1, p. 5-6.)

The gradual and successive development of these scales, is so well set forth in Mr. Peacock's valuable treatise, that we think no apology is necessary for a somewhat lengthened extract from it, even at the cost of some repetition.

"The decimal scale of numeration is not the only one which may be properly characterized as a natural scale. In numbering with the fingers we might, very naturally, pause at the completion of the fingers on one hand; and registering this result by a counter, or by any other means, we might proceed over the fingers of the same hand again, or with the fingers of the second hand, and register the result by another counter, or replace the former by a new counter which should become the representative of ten. . . . . Again, the scale of numeration by twenties has its foundation in nature, equally with the quinary and denary scales. In a rude state of society, before the discovery of other methods of numeration, men might avail themselves, for this purpose, not merely of the fingers on the hands, but likewise of the toes of the naked feet; such a practice would naturally lead to the formation of a *vicenary* scale of numeration, to which the denary, or the denary with the quinary, or the quinary alone, might be subordinate. . . . . Of other systems of numeration, the binary might be considered as natural, from the use of the two hands in separating objects into pairs, and from the prevalence of binary combinations in the members of the human body; but the scale of its superior units increases too slowly to embrace within moderate limits the numbers which are required for the ordinary wants of life, even in the infancy of society. . . . . As the necessity of numeration is one of the earliest and most urgent of those wants which are not essential to the support and protection of life, we might naturally expect that the discovery of expedients for that purpose should precede the epoch of civilization, and the full development and fixing of language. That such has been the case, we shall find very fully and clearly established,

by an examination of the numerical words of different languages; for, without any exception which can be well authenticated, they have been formed upon regular principles, having reference to some one of those three systems which we have characterized as natural: the quinary scale, whenever any traces of it appear, being generally subordinate to the denary, and in some cases, both the quinary and denary scales being subordinate to the vicenary. In some cases, also, we shall find, from an examination of primitive numerical words conveying traces of obsolete methods of numeration, that the quinary, and even the vicenary scales have been superseded altogether by the denary." (*Encyclopedia Metropolitana*, art. "Arithmetic," vol. I, p. 371.)

Decimal arithmetic thus appears to be coëval and coëxtensive with the human race. It is, indeed, perhaps, the most universal of human institutions, — at least as universal as language itself.* From this universality, most writers have called it the "natural" system; but on examining the question whether the number *ten* possesses any intrinsic excellence or convenience to recommend it, — any peculiar fitness as a ratio of geometrical progression, we find but one answer, — it has none. It differs from any other number only in quantity, not in quality. So far from its presenting any merit or advantage over its compeers, it is almost the last number which a true science of arithmetic would have selected for the important function of a radix of numeration. Its universality flows simply from the fact that the necessities of man impelled a selection, in the very earliest infancy of the race, long before the invention of letters, and while yet a language was but slowly being formed; and the selection comes to us stamped with the crude impress of a most irrelevant accident! Had the six-fingered giant slain by Jonathan, (2 Sam. xxi. 20,) lived early enough to be the father of the first unreasoning tribes, we should have had a duo-

* "We are not aware that there is an instance extant in any language, ancient or modern, of a complete numeral system formed upon a single radix other than the decimal. We have abundant examples, as already stated, of the occasional appearance of the quinary and vigesimal radices in scales which are chiefly decimal; and examples may be produced from numerals of the Celtic dialects of a strange mixture of the quinary, denary, and vicenary systems."—(*Lardner's Arithmetic*, chap. 1, p. 17.)

decimal arithmetic; or if, like the fowls of the air, we had usually but four toes to our extremities, we should now have been able to calculate only octavally; and in either event we should have been much more skilful computers than we are at present.* .

Decimal numeration is "natural" then, only in the sense that *ignorance* is natural. The fingers have no more real or "natural" relation to the properties of number, than have any other organs or divisions of the human body; and mathematically or philosophically considered, the *digit* is, therefore, no more a typical *unit* than a tooth, (of which there are thirty-two,) or the leg of a spider, (of which there are eight,) or the petal of a flower, (of which there may be any number.) Nor have any but the most ignorant races — those without a literature and an alphabet, — ever occasion to group and tally by their fingers. Only from unlettered savages could such a scale, therefore, have been derived.

It has been a favorite theory with a certain class of thinkers, that primitive man was a highly civilized being, — "a scholar and a gentleman;" and that the decay of states, and the decline of civilizations so unfortunately frequent in his history, but manifest his prevailing tendency to degeneration. Our universal arithmetic furnishes us with one of the most striking refutations of such a fancy. Wherever over the broad earth, the decimal scale exists, there have we the enduring monument of the ancestral savage — counting by his fingers or his naked toes.† Had any intelligent fore-

* "There can be no doubt that if man had been a twelve-fingered animal, we should now possess a more perfect system of numeration than we do. Whatever be the radix of the scale, it would always be a convenience to be able to subdivide it with facility, without resorting to the more refined expedient of fractional language."—(*Lardner's Arithmetic*, chap. 1, p. 21.)

† The German word for ten — *zehen*, — signifies "toes," being the plural of the word *zehe*. We do not generally or readily recognize this intellectual association in our own language; and yet the Saxon word — *ta* — a "toe," is in the plural *tan*. The *daktul* (δακτυλος) of the Greeks, and the *digit* (digitus) of the Romans, which signified either "finger" or "toe," appear evidently affiliated to the *deka* (δεκα) of the one and the *decem* of the other; although the genealogy (as in English) was probably more ancient than the languages themselves. So uniform are the laws of mind and matter, that we have only to select some rude and isolated tribe of modern savages, to discover with a naturalist's confidence, the exact process of development in numeration, with the aborigines of our race, millenniums on millenniums ago. Klaproth, in speaking of the inhabitants of the peninsula of Kamtschatka, says: "It is very amusing to see them attempt to reckon above ten; for having reckoned the fingers of both hands, they clasp them together, which signifies ten; they then begin at their toes and count to twenty; after which they are quite confounded, and cry "matcha," that is, where shall I take more?" — (*Sprachatlas*, page 16.)

thought ever presided over the inception of a numerical scale, — had any comprehensive conception of the uses and purposes of figures, in any single instance guided the selection of a ratio for their multiplication, — that ratio must inevitably have been something else than *ten;* the duplication of an odd number, — incapable of any other division, — neither a square, a cube, nor other power of any integer, — and in its successions among the most inefficient for the expression of fractional values, or for the extraction of roots. And if among the patriarchs of the human family, a rational scale had ever been so devised, some traces of this wiser system must have been found, to give a "sign" and memento of man's pristine elevation.

"The number ten," remarks Mr. Anderson, in his treatise on Arithmetic, "has been adopted by every civilized nation for the radix of the numerical scale. It has no peculiar advantages to recommend it, and seems to have been selected for that important function, merely because it expresses the number of the human fingers. We must regret that a circumstance so totally unconnected with every scientific consideration, should have determined an elemental principle, of the last importance to one of the most abstract, as well as one of the most useful of all the sciences; and that the decimal notation should still be retained, notwithstanding its evident imperfections, and the superior claims of other scales." (*Edinburgh Encyclopedia;* edited by Sir David Brewster, art. "Arithmetic," vol. 2, page 411.)

An able and philosophical writer in the *Edinburgh Review* holds very similar language. "Ten has indeed," he observes, "no advantage as the radix of numerical computation; and has been raised to the dignity which it now holds, merely by the circumstance of its expressing the number of a man's fingers. They who regard science as the creature of pure reason, must feel somewhat indignant that a consideration so foreign and mechanical, should have determined the form and order of one of the most intellectual and abstract of all the sciences." (*Edinburgh Review*, for January, 1807, vol. 9, page 376.)

A large number (perhaps even a large majority) of the well-

educated, have been accustomed to regard the decimal system as possessing a peculiar beauty and expressiveness, from the great facility with which the ordinary operations of arithmetic are performed by it. Indeed, after laboring at the tedious and troublesome reductions of compound numbers (consequent upon other scales of progression) unfortunately so often required to be made, the relief of a simple addition or multiplication in the homogeneous units of our common scale, is too striking not to excite a feeling of admiration for the easier process. It appears not to be generally considered, however, that this facility of computation is in no respect due to the series of "tens" by which we count, but is derived exclusively from the admirable notation in which the series has been clothed, and through which alone, we are in modern times made acquainted with it; and from the perfect conformity of the notation to the series. Any other scale will be found to exhibit an equal facility, if the same notation be employed, and made to correspond strictly with the selected scale. If, like the old Arabian philosophers, or like the ancient Greeks and Romans, we were compelled to calculate by a set of *alphabetic* numerals, we should be able to better realize how much we are indebted to that simple and yet grand invention of India, the "cypher-figures," or the set of figures with the device of local value.* This system of numerical language presents us with a formula of geometrical progressions, so illimitable in range, and yet so perfect in its conciseness and distinctness, that it transcends all conception that the ingenuity of man in all coming time shall ever be able to improve it.†

Though from a remote antiquity familiar to the Hindoos, (that wonderful people from whom the civilized world has derived so much,) it was wholly unknown to the nations of the earth until

* See note A — appended to this Report.

† "This method which is now used by every civilized nation, has all the precision we can desire, with the important advantages of conciseness and simplicity. It is impossible indeed for human ingenuity to contrive anything better adapted to the purposes of calculation. A more convenient scale than the decimal, might be substituted; but the principles of the notation itself, are incapable of improvement." (*Edinburgh Encyclopedia*, article "Arithmetic.")

comparatively modern times; having been first introduced into Arabia, less than a thousand years ago, and from thence by slow and successive centuries into the various languages of Europe.

However much the Arabic philosopher to whom belongs the honor of having first transplanted the Sanscrit Arithmetic into his own country, may have been impressed with its great power and beauty, he could hardly have appreciated to its full extent, the importance and magnitude of the gift he was instrumental in presenting to the civilized world; a transfer which Sir John Bowring in his "Decimal System," (chap. 2, p. 22,) has characterized as "the greatest step ever made towards the introduction of a universal language among the nations of the world." The Hindoo numerals, from the channel of their introduction into Europe, were generally called the "Arabic figures" — a title they still commonly retain, though it is one hardly just to the people with whom these figures had their origin.

Now although this Hindoo notation has never been popularly applied to any other than the decimal scale, it is obviously a formula of universal applicability; and if made use of to express a system of figures with any other radix than *ten*, would give the same facility to all the calculations performed by that system. Abstracting, for a moment, all specific va'ue from the terms "units," "tens," "hundreds," and "thousands," and regarding them merely as symbols of *local value* (designating only the orders of units,) we may exhibit in a tabular form, a series of scales, with the successive increments of value for each place, according to the radix, or ratio of geometrical progression selected. The letter "U" in the top line, denotes a "unit;" that is, any figure which may occupy a single place.

Table of Arithmetical Scales.

HINDOO NOTATION.	U.	UO.	UOO.	UOOO.			
Scale.	Units.	Tens.	Hund's.	Thous'ds.	Radix.	Logarithm.	Places.
Binary	1	2 —	4 —	8 —	2	.301	$\frac{10}{3}$
Ternary	1 — 2	3 —	9 —	27 —	3	.477	$\frac{25}{13}$
Quaternary	1 — 3	4 —	16 —	64 —	4	.602	$\frac{6}{3}$
Quinary	1 — 4	5 —	25 —	125 —	5	.699	$\frac{10}{7}$
Senary	1 — 5	6 —	36 —	216 —	6	.778	$\frac{50}{39}$
Septenary	1 — 6	7 —	49 —	343 —	7	.845	$\frac{20}{17}$
Octonary	1 — 7	8 —	64 —	512 —	8	.903	$\frac{10}{9}$
Novenary	1 — 8	9 —	81 —	729 —	9	.954	$\frac{20}{19}$
Denary	1 — 9	10 —	100 —	1000 —	10	1.000	1
Duodenary	1 — 11	12 —	144 —	1728 —	12	1.079	$\frac{25}{27}$
Quaterdenary	1 — 13	14 —	196 —	2744 —	14	1.146	$\frac{50}{57}$
Senidenary	1 — 15	16 —	256 —	4096 —	16	1.204	$\frac{5}{6}$
Octonidenary	1 — 17	18 —	324 —	5832 —	18	1.255	$\frac{4}{5}$
Vicenary	1 — 19	20 —	400 —	8000 —	20	1.301	$\frac{10}{13}$
Tricenary	1 — 29	30 —	900 —	27000 —	30	1.477	$\frac{25}{37}$
Quadragenary . . .	1 — 39	40 —	1600 —	64000 —	40	1.602	$\frac{5}{8}$
Quinquagenary . . .	1 — 49	50 —	2500 —	125000 —	50	1.699	$\frac{10}{17}$
Sexagenary	1 — 59	60 —	3600 —	216000 —	60	1.778	$\frac{50}{89}$

The number of places for each scale, is inversely as the logarithm of the Radix.

The most striking feature displayed by such a comparison of the different scales is the rapid increase of value in the higher ratios, as compared with the lower. While the *ternary* scale, for example, requires four figures to express so small a number as 27, the *tricenary* scale expresses one thousand times as many, by the use of no more places. The very first inquiry would, therefore, naturally be (in the absence of any other consideration) which would be found more convenient, — a very small radix, or a very large one?

The first and lowest scale of the series — the *binary*, presents with some disadvantages, many very remarkable advantages. In the first place it requires but a single figure, 1, (together with

the cipher for determining its place) to express with facility and precision all the values within the reach of figures.* According to the law of the Hindoo notation, by which every zero multiplies all the value that precedes it, by the amount of the radix, it results that the addition of a cipher to the figure 1, would of course multiply it by two, (instead of by ten as in our common system) — the addition of 2 ciphers, — by two times two, or four, (instead of by a hundred) — the addition of 3 ciphers, by eight; of 4 ciphers, by sixteen; of 5 ciphers, by thirty-two; &c. The first fifteen numbers would read thus: 1, 10, 11, 100, 101, 110, 111, 1000, 1001, 1010, 1011, 1100, 1101, 1110, 1111.† The present year, 1859, would require eleven places of figures to express it; namely, 11101000011. Fifty places of figures (or 1 and 49 ciphers,) in the binary system, would require but fifteen places of figures in the decimal system. One hundred places of the binary, (1 and 99 ciphers) would require thirty places of the decimal. So that the former system would involve, on an average, the constant employment of about three and a third times more figures in all our arithmetical operations, than the latter system, or that in common use. This increased expenditure of time and manual labor, would evidently be a very serious inconvenience. On the other hand it must be considered that the writing down of any given mass of figures, in only two characters (always either a 1, or a cipher,) would be much more easy and expeditious than if the mass consisted of ten different characters; so that the actual increase of trouble should be set down at probably not more than *double* that we have at present. This much quantitatively. But in the quality of the work done, the difference will be found immensely in favor of the binary scheme. In the first place no tables would be required to be committed to, and retained by, the memory; either of addition, of subtraction, of division or of multiplication; not even

* It was in reference to this curious property of the scale, that a medal struck in honor of Leibnitz, and to commemorate his invention of the binary system, bore on its reverse, the striking inscription: "Omnibus ex nihilo ducendis sufficit Unum." Unity being very commonly regarded as the symbol of the Deity. — (*Peacock's Arithmetic*, Encyclopedia Metropolitana, vol. 2, page 392.)

† See note B — appended to this Report.

the fundamental "twice two make four!" Every form of calculation would be resolved into simple numeration and notation. In fact, calculation as an effort of mathematical thought, might be said to be entirely dispensed with, and the labor of the brain to be all transferred to the eye and the hand. A perfect familiarity with the notation of the scale, and with the simple rules of position, would enable the operator to determine in every case by mere inspection whether the next figure should be a 1, or a 0. It follows that the only errors possible in such a work, would be the merely clerical ones of the eye or hand; and when we reflect that a large majority of the arithmetical errors committed, are usually those of the brain, fatigued or bewildered by the constant strain upon the attention and memory, this consideration of the increased accuracy of such a system, is one of the very first importance in estimating its value. To many, the relief it proffers in exchanging head-work for hand-work will appear no trifling recommendation; and it may well be doubted, whether in all important and lengthy calculations, the binary system would not be found to afford a real economy of labor, instead of an increase as has been generally supposed.

It has been previously noticed, that the great Leibnitz, the rival of Newton in the invention of the "Differential Calculus," proposed this system, and zealously urged its adoption; although he thought that for more common purposes it would be found too prolix. "De Lagny took the trouble of constructing logarithms on the principles of this arithmetic, as being more natural than those usually employed. . . . . He even proposed to substitute the binary arithmetic for logarithms, affirming that it was more simple and expeditious, and conducted to the object in view in a less indirect manner." (*Anderson's Article on Arithmetic, in Brewster's Edinburgh Encyclopedia*, vol. 2, pp. 376 and 409.) The same writer adds that "Dangicourt has applied the binary notation with greater success to progressions, and proved that the laws of a series may be detected by it more easily than by any other scale." (Page 409.) This results, it may be as well to state, from the fact

that "circulating periods" of figures return far more frequently in this scale than in any other.*

The *Ternary* scale, although it is also a very simple scale, has nothing else to recommend it; being incapable of integral bisection, and having very nearly the redundancy of the binary scale, without one of its advantages. It may be regarded as the most objectionable of all the scales; and indeed none of the odd numbers, could, for a moment, be accepted as a suitable radix of notation.

The *Quaternary* scale, as derived from the second power of the binary scale, has many of its excellences. While it employs less than half the number of digits, of the common or denary scale, to task the memory and attention, it requires only about five places of figures, for three of the latter. It combines, therefore, great simplicity of structure, with a moderate range of notation, and would form a very convenient and practicable system of numeration; while it would furnish an admirable scale of division for weights and measures of all kinds. It is said by Balbi, that a very low and ignorant tribe of Indians in South America, — the Guranos — had names only for four digits, and that after counting these a second time (to eight) they were unable to proceed any further. The correctness of this account, appears, however, to be exceedingly doubtful. It is remarkable, too, that Aristotle mentions a tribe of

* From the comparatively slow rate of progression in this scale, its places of figures advancing in value by the successive powers of *two* only, instead of by the powers of *ten*, as in our present system, it might be supposed that its capability of expressing large amounts was very limited; and there are probably very few who would not be startled by the announcement, that the number of the stars of heaven, including all those made visible by the most powerful telescopes, — the milky way, — and all the mighty nebulæ resolved, — added to the number of the grains of sand upon the seashore, would all be expressed by the binary notation in a single row of figures, not extending across a sheet of common letter paper! And yet this can be very easily shown. Assuming that a cubic inch of sand would contain ten million grains, the number of grains of sand necessary to constitute a globe as large as our earth, would not exceed 659 quintillions: an expression requiring but thirty-three figures. In the binary scale this would require only 109 figures. Our sun is a million times larger than our earth. Supposing that even this huge globe were composed of sand, we should have to add but 20 ciphers to these 109 figures to multiply them by a million, and to express the entire number, in the binary notation.

Thrace as being unable to count beyond four,—a statement equally incredible.

The *Quinary* scale, whose notation would require ten places for seven of the *Denary*, has nothing to recommend it; and yet from the accident of man being afflicted with five fingers, it has generally formed the basis of the scale in common use, and traces of it are to be found in perhaps a majority of the nations of the earth. The numerals of Malay and Java were anciently, for the most part, quinary, in subordination to the vicenary grouping. A trace of this system is also seen among the ancient Greeks, in their word πεμπαζεσθαι; (to count by fives;) as it is among the Romans in their notation of numbers above 5, 15, &c. The Persian term for "five" is *pendja;* and *pentcha* signifies the expanded hand. Among the South Sea Islanders, the inhabitants of New Caledonia and the Hebrides, as well as the barbarous tribes of north-eastern Asia, the quinary scale appears still to prevail. The central tribes of North America show also traces of this digital period; and they are frequent among the innumerable languages of Africa. Thus with the Jalloffs, the word for "five"—*juorom*—signifies the "hand." So with the Foulahs, the Jallonkas, the Fellups, &c. There are no examples, however, of the number five ever having been used as a true radix of notation; that is, as a direct ratio of continued progression; $5; -5 \times 5, (25;) -5 \times 5 \times 5, (125;)$ &c. The quinary scale has seldom gone further than 20.

The *Senary* scale would require about 17 places of figures for 13 of the common scale; and its notation would therefore have about a one-third greater extent. Though not one of the most desirable scales, it would be much superior to the denary system. The simplification arising from the reduction of its digits, would much more than counterbalance the extension consequent on the increase of its places. Like the denal scale, it admits of but one bisection; but it possesses the great superiority of admitting at the same time of a trisection. No examples of this scale are to be met with; although it is said to have been at one time decreed in China, by the caprice of an Emperor, who had conceived some astrologic fancy for the number six.

The *Octonary* scale approaches very nearly to the common scale in its capability of expression, as it requires on an average but one ninth more places of figures to represent any given amount; that is, ten places of this scale would be equivalent to nine places of the denary. Being derived from the third power of the binary scale, it possesses most of the advantages of that system; though not its admirable simplicity. Like the quaternary, it admits of continued bisection down to unity; and, of course, of indefinite bisection below 1, by the simple expedient of an inverted, or negative notation, (as in decimal fractions.) As a perfect cube, it has peculiar advantages both as a radix of numeration, and as a ratio of progression or of division for weights and measures; and in the latter respect particularly, there is, perhaps, no other number that would so well express the average range of a convenient metrical multiple.

The *Denary* scale* may be said to present a tolerably convenient mean between the prolixity of a very small radix, and the intricacy of a very large one: besides which, it possesses the immense advantage of a universal establishment. But beyond this, there is nothing to be said in its behalf. Intrinsically, it is one of the most imperfect and troublesome scales which could be selected. Still, the inconveniences of the system should be very serious and very apparent, and the claims of any rival scheme very unquestionable, to justify the advocacy of a change, which would root up all our established forms and habits of calculation, — which would destroy the accumulated products of centuries of industrious thought and toil, — which would entail upon us generations of new labor to attain even the same standard of tabular detail, and statistical information, now possessed; and which, more than all, would wholly demolish, and perhaps hopelessly, that uniformity so essential to

* The name "Decimal," by which our present system of arithmetic is commonly designated, appears not to have a perfect propriety. The terms "Octaval," "Nonal," "Decimal," "Duodecimal," &c., are derived from the Roman "*ordinals*," and belong to the series Primal, Secundal, Tertial, Quartal, &c. The idea really involved, is not that of relation to a *tenth*, but of relation to a grouping *by tens*, and would require the term "denal" or "denary" — from the Roman "distributive" numerals, of which the terms "binary" "ternary," &c., commence the series.

the language of scientific investigation, and so universally conceded to be one of the most important aims and results of every project of metrical, or numerical improvement.

Upon this basis must the question of so radical a revolution rest. But if it is shown that uniformity in many other relations than those of simple number, and no less vital to the interests and welfare of the race than this boasted uniformity of figures, has constantly and irretrievably been sacrificed to this great idol, — if it is established by the voice of all experience that neither national nor international standards of length, of weight, of area, of volume, or of value, of any single subject, in short, to which these figures can be usefully applied, have ever the slightest hope of obtaining a general authority under the dynasty of this " universal " power, — then must it be dethroned, for very uniformity's sake, and a new dispensation introduced, developed from such principles, and invested with such attributes, that it may rationally be expected to gain at length a universal ascendency, through the concurrent approval and adherence of all intelligent nations. For the attainment of a real uniformity, there seems no other process or alternative; and for such an attainment, no sacrifice of temporary convenience could be held to be too great. The faults of the denary system are too radical to be amended, — too obnoxious to be endured. Sheltered by the inertia and conservatism of inveterate habit, it has been tolerated already much too long. The unskilful contrivance of an early age, it is all unsuited to the wants or uses of an adult manhood of the race.

The *Duodenary* scale has over the denary the advantage of allowing two bisections, and, at the same time, like the senary scale, of admitting of a trisection. Its variety of factors, 2, 3, 4, and 6, give it a much greater power of expressing fractional values than any other scale below it, or immediately above it; and it has accordingly been always found a convenient and favorite number for metrical divisions. The acres, the feet, and the pounds of the Romans were all divided by 12; as are the foot, and the Troy pound, still with us. The signs of the Zodiac, the months of the year, and the hours of the day, have illustrated the number

from the remotest antiquity. In the old French measures of length, the foot was not only divided into 12 inches, but the inch into 12 lines, and the line into 12 points. The "dozen," the "gross" (or 12^2) and even the "great gross" (or 12^3) are widely used in trade at the present day, for the packages of a variety of articles. From the many acknowledged advantages of the duodenary scale, it has found frequent and warm advocates for its adoption as a system of numeration.* In the necessity of two additional integers, it would offer however a considerable increase of complexity and mental labor; while the economy of places in notation could scarcely be regarded as appreciable, — 25 of the duodenary being required for 27 of the denary. As compared with the octonary, it would require 5 places, where the latter would require 6; so that while its digits are more by 50 per cent., the excess of the other in places is only 20 per cent. But there are

* A writer in the *Edinburgh Review*, in expressing a very natural regret that the philosophers of France, when engaged in making so radical a change in the measures and standards of the nation, did not attempt a reform in the popular *arithmetic* as well, appears to regard the duodecimal radix as superior to all others. "The French Academicians"— he says — "though freed at the moment we now speak of, like the rest of their countrymen, from the dominion of the inertia which reigns so powerfully both in the natural and moral world, and gives the time that is past such influence over that which is to come; though delivered from the action of this force in a degree that was perhaps never before exemplified, may be accused, at least in one instance, of having innovated too little, and of having been too cautious about departing from an established practice, though reason was by no means on its side. What we allude to is the system of arithmetical computation, in which they resolved to adhere to the decimal scale, instead of adopting the duodecimal, which from the nature of number, is so evidently preferable. . . . . The property of the number twelve which recommends it so strongly for the purpose we are now considering, is its divisibility into so many more aliquot parts than ten, or any other number that is not much greater than itself. Twelve is divisible by 2, by 3, by 4, and by 6; and this circumstance fits it so well for the purposes of arithmetical computation, that it has been resorted to in all times, as the most convenient number into which any unit either of weight or of measure could be divided. The divisions of the *As*, the *Libra*, the *Jugerum*, the *Foot*, are all proofs of what is here asserted; and this advantage, which was perceived in rude and early times, would have been found of great value in the most improved state of mathematical science. . . . . We regret therefore that the experiment of this new arithmetic was not attempted. Another opportunity of trying it, is not likely to occur soon. In the ordinary course of human affairs, such improvements are not thought of; and the moment may never again present itself, when the wisdom or delirium of a nation shall come up to the level of this species of reform." (*Edinburgh Review*, Jan. 1807. Vol. 9, page 376.)

far more important considerations than these, which unfortunately oppose themselves to the adoption of this system, as the best substitute for the denary, notwithstanding its admitted features of superiority.

The most fatal objection to the radix 12, is that it permits only a single bisection beyond that given by the radix 10. The quality of continued divisibility, we regard as paramount to all others; not merely for the convenience of art and trade, universal as their requirements are, but even for many scientific purposes; and however valuable the property of a *varied* subdivision, (as that furnished by the duodenary scale,) experience has fully demonstrated, what is clearly seen by theory, that no aliquot parts can ever be as widely useful as the binal fractions. Another objection to the 12 scale, somewhat allied to this, is that the number is not a *power* of any integer,—a point, as we shall discover, of no slight importance. In this respect, it may be remarked, the number nine (awkward and inconvenient as it undoubtedly would be as the basis of an arithmetic,) would have several advantages over the number ten, and even over the number twelve. A third objection to the scale under consideration, which though not so striking, is yet (as we think can be made apparent) no less real, is that the radix is too large. On the simple score of size, there must be somewhere in the indefinite range of scales, a point where we should expect to find the most convenient medium between the inexpediences of opposing difficulties; and although this most advisable limit of magnitude may not admit of very precise determination, the question is one of too great consequence in the comparisons we are making, not to deserve a special attention.

The *Seni-denary* scale presents many excellent points, the number 16 being both a square, and a fourth power, and admitting of indefinite division by two. Its only disadvantage is the incommodious number of digits it would require; while its notation would yet economize only a single place of figures in every six places required by the denary scale.

The *Vicenary* scale furnishes no single point of merit which could recommend it to our acceptance, unless its divisibility by four should

be regarded as giving it a superiority to the denary. With an exceedingly troublesome and unwieldly range of digits, it would reduce the extent of our common notation only from 13 to 10 places. Man was however unfortunately born with 20 extremities, or branches to his limbs, and hence traces of what may be designated a rudimentary vicenary scale, are to be met with among many nations, both ancient and modern. In ancient Phœnicia and Palmyra, the system of numbering by twenties as far as the hundred, prevailed; and from these nations it was derived by the Celtic languages, in all of which, its remains are still found. Among the Scandinavians, also, is found a vicenary numeration. The Greenlanders having counted fingers and toes in periods of five, designated the number 20 by the word *innuk*, which signifies a "man." If they have occasion to proceed higher, the expression for 40 is *innuk arlak*,— "two men,"— &c. A similar method existed among the Aztecs of ancient Mexico; as well as among the tribes of South America. The Teutonic races retain in their languages the traces of the ancient "score," and in parts of England, counting by scores, or twenties, is still quite usual. The translators of our Bible have frequently (though by no means uniformly) introduced this mode of enumeration. Thus we have "threescore and ten," (Ps. xc., 10,) — "threescore and twelve," (Numb. xxxi., 38,) — "threescore and fifteen," (Acts vii., 14,) — "threescore and seventeen," (Judges viii., 14,) &c., &c. The mode of numbering—still in common use in France, also exhibits a very remarkable retention of the antiquated vicenary system.*

This scale is not, as might be supposed, an extension of, and attempted improvement upon the decimal system. On the contrary, it almost universally preceded it; and its employment belongs to the very earliest and rudest stage of barbarian society. It betrays a period of human intelligence, so destitute of all re-

* "The French nomenclature is for the most part purely decimal. The decimal system is observed from twenty (*vingt*) to sixty (*soixante*); here we find a vestige of an old vicenary scale. Seventy, instead of being *septante*, as the decimal system would require, is *soixante-dix*, (sixty-ten); seventy-one, *soixante-onze*, (sixty-eleven); seventy-two, *soixante-douze*, (sixty-twelve,) &c. Eighty, instead of being *octante*, is *quatre vingt*, or four twenties, and ninety is *quatre-vingt-dix*, (four twenties ten); ninety-one, *quarte-vingt-onze*, (four twenties eleven), &c. Thus twenty becomes the radix of the system from sixty to a hundred." (*Lardner's Arithmetic*, page 11.)

source, that fingers and toes must all be pressed into service, to meet the common wants of number; and when these have been exhausted, there has been found among some tribes, no power of thought or word or symbol for aught beyond. It indicates a period long before a conception of any expedient for numerical progressions had dawned upon the savage brain; and hence there is no example of the vicenary scale having ever been extended even as far as to the second place of figures, or to 20 times 20; — nor probably even beyond one hundred. It is evident that when the necessity for expressing larger numbers began to be felt, the cumbrous scale of added "toes," must soon be dropped, and the range restricted to the more manageable mechanism of the ten "fingers." And accordingly, we find the imperfect vicenary to be always overlaid by the denary, with glimpses of the former still appearing through its supplanter.

The *Sexagenary* scale deserves notice only from its historical interest in having been from a very remote antiquity employed for particular purposes among the people from whom we derive our arithmetical notation, — an employment which has been perpetuated throughout Europe and America, to the present, in the smaller divisions of time and of the circle. This scale is of course by far too cumbrous in the range of its units to have ever had a true notation, or to be ever possible as an actual system, founded on its own radix. With its enormous complication of figures, it would still require about $\frac{8}{15}$ (or more than half) of the places of the common system to express its values. It has been found very useful, however, in its limited application, both from the rapidity of its progressions, and from the remarkably varied range of divisibility it permits. The number 60 is divisible by 2, by 3, by 4, by 5, by 6, by 10, by 12, by 15, by 20, and by 30; and has indeed the greatest number of aliquot parts of any number below 120.

Our "minutes," and "seconds" of the degree and of the hour, have thus an Oriental origin. In India, however, from whence the scale was derived, these divisions, as applied to time, had not the same value as with us; as there the day itself was divided into 60 parts, called *guries*, (hours of 24 minutes,) each *gurie* into 60 parts,

called *polls*, (minutes of 24 of our seconds,) and lastly each *poll* into 60 *mimiks*, or twinklings of an eye, (four-tenths of a second.) It is believed that this division of time is retained by the Hindoos to the present day. They also employ a period of 60 years, as we do the century.

In its astronomical application this scale has been found exceedingly useful. The properties of the circle require that it should be frequently divided into sixths, as well as into quarters; the sixth being, as is well known, the radial arc, — or that whose chord is exactly equal to its radius. The zodiacal, or ecliptic circle of the heavens had from the earliest antiquity been divided into twelfths, a period representing approximately the movement of the sun during one lunation. As this comprised very nearly 30 days, the "sign" became naturally divided into 30 degrees; and this expresses so closely the arc of the earth's orbit described in one mean solar day, that when the earth is moving slowest, (or at its aphelion,) it falls but 3 minutes within one degree, and when it is moving fastest, (or at its perihelion,) it exceeds the degree by only a single minute. The radial arc of two "signs," or 60 degrees, suggested its own subdivisions. Hence was derived the table of 60 seconds to the minute, 60 minutes to the degree, and 60 degrees to the sextant, — 6 of these comprising the circle. This system, answering so well the requirements of various division, was introduced from India into the Alexandrian school, by the illustrious Ptolemy,* who did so much toward giving astronomy a scientific form. The sexagenary scale has never, however, been computed by any other than a denary radix. It must excite surprise, therefore, that the Hindoo notation of the scale was not also introduced by Ptolemy at the same time; and the world thus put in possession of this grand invention eight centuries earlier than it was by the Arabic importation.†

* Although the sexagesimal arithmetic is commonly ascribed to Ptolemy, it is probably an Eastern invention. The Indians to this day, employ the sexagesimal division of time." (*Edinburgh Encyclopedia*, art. "Arithmetic."

† The Greeks, like the Hebrews, Arabs, and all other nations excepting the Hindoos, employed an alphabetic numeral; and it is a somewhat curious circumstance that our modern character for the cipher, was derived not from India or Arabia, but from Alexandria. The Hindoos indicated the cipher place by a simple dot, (·) and the Arabians, in borrowing their system, did the same; until the sexagenary system, introduced by

In our survey of the principal scales, from which alone a selection could be made for popular uses, we have found that there are certain incidental, but opposing advantages, incompatible with each other; and that no scale, therefore, could possibly furnish a maximum of every condition that might be thought desirable. Thus the binary scale affords so admirable a simplicity, beauty and facility, that it would have to be regarded the perfect system, did not its redundant employment of figures, (the necessary consequence of its simplicity,) render it unsuited to the small and constant calculations required in the daily course of trade. On the other hand, the manifold divisions permitted by the sexagenary scale, give it convenient qualities, impossible to the lower scales; but here we find a complication so onerous that it would appal the most inveterate of calculating monomaniacs.

The conditions, however, that are really most essential to an arithmetical radix, are so few and precise, and their requirements so imperative, that there is little difficulty in deciding upon "the best possible scale of numeration." The first consideration would naturally have regard to the size of the radix, in order to assign certain limits within which our scale is to be found. To realize a maximum convenience, it must be neither too large, nor too small. We have seen that while the notation of places (and the consequent labor of transcription,) diminishes very slowly with the ascending scales, — the tax upon the mental faculties, increases in a far more rapid ratio. The labor of mere *calculation*, which may be estimated at zero for the binary scale, advances materially, and in a compound ratio with every figure added to the radix. Were we then required to choose between any two scales — separated by

Plotemy so many centuries before, supplied them with a new character. This philosopher, finding a frequent occasion to mark the absence of a particular denomination, (as "no minutes," or "no seconds,") in order to avoid mistake, employed the first vacant letter of the alphabet for that purpose. As the Greek numeral for 60 is the letter ξ all those which followed would be useless for the sexagenary scale; hence the next letter, ο (omicron) naturally became the empty counter. This notation became established by long habit among the astronomers of Alexandria, Constantinople, and Arabia; and finally crept into the Hindoo system of numerals. Thus to the accidental position of the Greek letter *omicron*, which happened to represent *seventy*, we are indebted for the present form of our modern cipher, as a circle, instead of a decimal period.

a considerable interval, that is, between a very small one and a very large one, (no other insuperable objection being supposed) we should adopt, unhesitatingly, the smaller one. The advantage imagined by some, of the great expressiveness of a rapid increase of value, is wholly illusory. It needs comparatively very few figures, in any case, to carry us not only beyond all true conceptions of magnitude, but beyond all rational requirement of any real calculations we can devise.* There is, in the law of continued geometrical progression, even on its lowest scale, a power so overwhelming, that we feel we have no extra wonder or admiration left to spare, upon these "infinites of higher order," and confess to a predilection not to travel at such dizzying speed.

The world has had some centuries of experience in the denary arithmetic. We are all familiar with the laborious and tedious discipline by which its practice is acquired; and we are all conscious of the exertion of thought demanded to perform a lengthy operation in figures. When we consider the amount of time bestowed in training youth in this branch of learning; and yet the fact that not one half so trained, are really expert in calculation, we must record it as our deliberate conviction, that *the denal radix is too large.* We believe that a lower figure would give the true desideratum — the *minimum* of labor. Nay, as between the scale of

* To give an illustration of the truly infinite power of figures, let us strain our imagination to devise some overwhelming product. Light, which (were it prone to devious courses,) would flash around our globe in eight completed revolutions during one single tick of the clock's pendulum, would travel in one hundred thousand years, only 607 thousand billions of miles, (a period of 18 figures) — or multiplied by the inches in the mile, — 38,463 trillions of inches; (requiring 23 figures.) According to the received data of the undulatory theory, the extreme violet ray of the luminous beam (the most rapid of the prismatic spectrum,) vibrates 727 millions of millions of times in a second! Let us suppose the remotest of the telescopic nebulæ to be in light measure, one hundred millions of years distant; — how many undulations must its light perform before reaching our eye? Nay, as we can only conceive of the material or stellar universe as a finite extension (or point) in the infinite void, let us suppose (for definiteness of idea!) that the confines of this entire *Cosmos* were sixty thousand times more distant than this faintest nebula,— or six billions of years, — even *then* the undulations of light throughout that unimaginable space, would be expressed by 137,651 quintillions; (or 36 figures.) Or if we wing our flight as far in the opposite direction, we do but multiply these figures by 2, for the whole extent, — without even adding a single place of figures to express this entire diameter! (275,302 quintillions). And this may all be written down with ease — upon the thumb-nail!

ten and that of *six*, we incline to the opinion that the latter would be found the more convenient notation. Its labor, both of acquisition and of exercise, would certainly be far less than half; while its figures in use would only be about a third more. *A priori*, we might expect that a scale established in rude and inexperienced times, (were it not that it was really determined by an arbitrary and extraneous circumstance) — would be too large in its ratio of progression, — rather than too small; and that a more enlightened age would find it convenient to reduce it; just as we have seen to occur with the vicenary and the denary scales, in their early history.

The second essential that should be demanded in a radix is that it must admit of indefinite bisection, or in other words, that it must be found among the powers of two; namely, 4, 8, or 16. As 4 is probably too small, and 16 certainly too large, — we have the octonary scale alone left to satisfy our two most vital conditions of a medium size, and a complete divisibility. The concurrence of these qualities in any one scale, and in that one alone, is sufficient to establish its claims against all competitors. There is but one scale which could have any pretensions to be considered a rival, or which would be likely to find intelligent advocates; and that is the duodenary. Much stress has been laid upon the number of its aliquot parts. That this quality is a highly useful one, we frankly acknowledge, but yet, as we maintain, not near so useful as that other quality this radix lacks, the facility of successive halving. The number 12 is not a power; the number 8 is a cube; — an important advantage in several respects, but particularly in the application of this scale to a system of metrology, from the simple relations thereby established between the measures of length and those of volume, — by which both weights and measures of capacity are determined. All that has been said on the subject of the denary being too large a scale, applies with much greater force against the duodenary. And, finally, we believe that a large majority of the mathematicians would give their vote unhesitatingly in favor of the octonary arithmetic. It appears to combine advantages of the very first importance, and those impossible in any other scale.

While perfectly adapted to the highest requirements of science, it is as exactly suited to the trivial wants and petty occasions of our daily life. It possesses a degree of simplicity the most attainable without a sensible increase of figuring. The simple suppression of the two largest digits of our common systen (8 and 9) throughout every place of figures, would be found, we think, to reduce the working labor by at least one half. In choosing between a radix of a second power, (as 4,) and one of a third power, the latter would for several reasons be preferred. It would undoubtedly be advantageous for it to be at the same time both a square and a cube. But unfortunately we can meet with no such favored number, until we reach the period 64. Our octonary radix is, therefore, beyond all comparison the "*best possible one*" for an arithmetical system.

After this somewhat tedious preparatory exposition, we now propose to briefly develop the scale of numeration thus selected; and to derive from it an ideal system of measures, based throughout upon the leading ideas of the French system;—availing ourselves, as we believe, of every beauty and refinement offered by it, and avoiding, as we are no less firmly persuaded, every difficulty, and defect inherent in it. Let us attempt to employ our proposed scale of number in the first place, by putting it in an intelligible form. Although we might readily discriminate between the octonary and the denary notation by the simple expedient of using a somewhat different type, of our common figures, (suppressing the 8 and the 9,) yet even with this device, the association of local value is so strong that it would not be easy to avoid confusion of idea in attempting to read and understand the unfamiliar conversion. It will be found much easier, therefore, to devise a set of characters for the octonary scale; which should be entirely distinct both from the letters of the alphabet, and from our ordinary figures. To assist us still more in reading them, these characters might be made significant symbols, by the number of lines employed in the construction of each, though this would be a matter of very little importance in a form of character that should be permanently adopted. The characters should all be simple; they should all have the same size, for the obvious convenience of the typographic "dress;" and they

should be so distinctive, that no one could easily be mistaken for another. Let us then represent *one* by L; *two* by C; *three* by E; *four* by F; *five* by P; *six* by G; and *seven* by H; the cipher having no intrinsic value, may very well continue to be still represented by O. Our eight *digits*, then, (if we must still use so barbarian and unmathematical a designation,)* would stand thus: OLCEFPGH.

In reading these octonary numbers, a distinctive name for each, as well as for the places occupied by them, would become even more necessary than a distinctive form. The terms "ten," "hundred," thousand," especially, are too essentially decimal in their origin, and too ineffaceably stamped by usage in their significance, to permit their use in any novel application. The names, like the symbols, should be both as simple and as distinct as possible. The simplest name is a monosyllable, containing but one consonant, and one vowel sound. Let this then be the rule of our numerical vocabulary. It will be convenient and even advisable to preserve a resemblance to the popular numerical language, that the analogy of structure may be the more apparent. The word *one*, will naturally give us the French "un,"—*two*, will give us "du;"—*three* will give us "the;" the consonant sound being really a simple one, although requiring two letters in our language. The word "tre" would have been better, as being very near the Latin *tres*, the Greek *treis*, and the original Sanscrit *tri*;† but the double conso-

* It has been sometimes remarked by advocates of the octonary arithmetic, that if our stupid ancestors had only used their thumbs as the counters of the digits, they would have found that they had but eight fingers, and we should then have had the octaval period—"founded in nature." It may be supposed from the preceding discussion of this subject, that we attach but little importance to such a consideration.

† It is a matter of curious philological interest to trace the Sanscrit or ancient Indian parentage of all our modern European languages; especially in the names of the numerals. In this particular the different vocabularies of the numerous and wide-spread races,—of the Celtic, the Romaic, the Sclavonic, and the Gothic, with its two great families of the Scandinavian, and the Teutonic,—appear only as dialects of each other. The names of the first ten numbers, in a few languages, are here selected, mainly from the Introduction to Bosworth's Anglo-Saxon Dictionary.

nant excludes it under our rule. The word *four* will give us "fo;" but for five, in order to avoid a consonant recurrence, we shall have to resort to the original Sanscrit, *pancha*, which will give us "pa." Our *six* will give us "si" or "se;" but for our next number, as we can derive no satisfactory help from English or Latin, Greek or Sanscrit, we are driven to some arbitrary syllable. As seven is the last of our series, we may accept the single independent term with less reluctance; and that its sound may be as distinctively marked as possible, let us call it "ki."

Here, then, we have assigned for each of the numerals "a local habitation and a name."

L *Un;* C *Du;* G *The;* F *Fo;* P *Pa;* G *Se;* B *Ki.*

Our decades — twenty, thirty, forty,— offer us the very suitable and simple suffix "ty" to designate our octades. Our hundred suggests the syllable "der" as a convenient designation of the third place

SANSCRIT.	Persian.	Greek.	Roman.	Welsh.	Gothic.	German.	Saxon.	English.
Aika	*yika*	*eis,en*	*unus*	*un*	*ains*	*ein*	*an*	*one*
Dwau . . .	*dy*	*duo*	*duo*	*dau*	*twai*	*zwei*	*twa*	*two*
Tri	*seh*	*treis*	*tres*	*tri*	*threis*	*drei*	*threo*	*three*
Chatur . . .	*chehaur*	*tessares*	*quatuor*	*pedwar*	*fidvor*	*vier*	*feower*	*four*
Pancha . .	*pendj*	*pente*	*quinque*	*pump*	*fimf*	*funf*	*fif*	*five*
Shash. . . .	*shesh*	*hex*	*sex*	*chwech*	*saihs*	*sechs*	*six*	*six*
Saptan . . .	*heft*	*hepta*	*septem*	*saith*	*sibun*	*sieben*	*seofen*	*seven*
Ashta. . . .	*hesht*	*okto*	*octo*	*wyth*	*ahtan*	*acht*	*eahta*	*eight*
Navan . . .	*nuh*	*ennea*	*novem*	*nan*	*niun*	*neun*	*negon*	*nine*
Dashan . .	*deh*	*deka*	*decem*	*deg*	*taihun*	*zehen*	*tyn*	*ten*

That these Sanscrit terms should have been so widely diffused, while yet no traces of the Hindoo arithmetical notation should ever have been found outside of India, would seem to show that this derivation was antecedent to the formation of a written language; or, at least, prior to the invention of the *cipher*. A nomenclature may be easily transmitted orally or by tradition: a notation could be communicated and preserved only by records.

We may here remark, that to the Sanscrit we are indebted for the denominations of our two lowest coins. From the Sanscrit *Sata* or *Shatum* (a hundred), through the Latin *centum* we obtain our "cent;" and from the Sanscrit *Dasa* or *Dashan* (ten), through the Latin *decem*, and the French *disme* or *dime*, we obtain the name of our "ten-cent piece."

of figures; and our thousand, will give us "sen." And here we may improve upon our present mode of expressing "places" by employing these distinctive suffixes, as independent nouns, significant of a particular order of units, without reference to any special or intrinsic value. Thus a simple unit would indicate any figure occupying the first place; a Ty would indicate any figure occupying the second place; a Der, any figure occupying the third place, &c.

But mindful of that prudent law — "economy of means," — and not to burden our infant scheme with too great a load of unfamiliar nomenclature, (always the greatest obstacle to the reception of any novel system,) let us resort to combinations of these simple suffixes, instead of applying a new term to each new place of figures. By this means we shall be required to introduce new terms, only at the successive and advancing powers of each great unit. Thus using "Ty" for the second place, and "Der" for the third place, we may very well employ the word "Ty-der" for the fourth place, "Sen" for the fifth place, "Ty-sen" for the sixth place, "Der-sen" for the seventh place, and "Ty-der-sen" for the eighth place. Here is a pause; and to do honor to the number *eight*, — this should comprise one independent period of figures; to be followed by a new term, the analogue of our MILLION.* We cannot derive a convenient suffix, however, from this term; we shall therefore have to coin a new one. Let us call our great figure KALY. We have thus the progression; one "Ty" squared, is one "Der;" one "Der" squared, is one "Sen;" one "Sen" squared, is one "Kaly;" the intermediate places being expressed by the obvious compounds of these words. Or to illustrate the series proposed, by our own decimal terms, it is as though having assigned eight places of figures instead of six, for our million origin, we should reach it by this scale: tens, hundreds, ten-hundreds, thousands, ten-thousands, hundred-thousands, ten-hundred-thousands, millions:

* Our *Million*, the square of the Roman *Mille*, is a comparatively modern word; and useful as it is now universally esteemed, it appears on its first introduction to have met with but little favor. "Bishop Tonstall, who has discussed at great length the Latin nomenclature of numbers, speaks of the term *million* as in common use, but he rejects it as barbarous." (*Peacock's Arithmetic.*)

the "ten-hundreds," and the "ten-hundred-thousands," being interpolated places.

Words manufactured to meet a new want, have always a somewhat barbarous and uncouth sound, until familiarized by custom; and are usually received but slowly and with reluctance. Unless they can boast a pedigree and a history, they must expect from the world, like other *parvenus*, no very cordial greeting. From the habits of thought of a very large majority of mankind, it is found so much easier to use old words in a double sense, than to accept the precision of a new phraseology, that there is little doubt the octonary notation could be much more readily taught (except to children) by simply erasing the figures 8 and 9, from the common arithmetic. That it is more philosophical, however, to assign to everything its own appropriate name, can scarcely need a formal statement; and if the system now proposed have the high claims and merits we have represented, we think that no apology is required for the attempt to clothe it in a fitting garb. We here present accordingly the numeration table, as resulting from the names we have just above suggested :

Numeration Table.

L, Un	= 1	LL, Unty-un	= 9	CL, Duty-un	= 17	GL, Thety-un	= 25
L, Du	= 2	LC, Unty-du	= 10	CC, Duty-du	= 18	GC, Thety-du	= 26
L, The	= 3	LG, Unty-the	= 11	CG, Duty-the	= 19	GG, Thety-the	= 27
L, Fo	= 4	LP, Unty-fo	= 12	CP, Duty-fo	= 20	GP, Thety-fo	= 28
L, Pa	= 5	LP, Unty-pa	= 13	CP, Duty-pa	= 21	GP, Thety-pa	= 29
L, Se	= 6	LS, Unty-se	= 14	CS, Duty-se	= 22	GS, Thety-se	= 30
L, Ki	= 7	LS, Unty-ki	= 15	CS, Duty-ki	= 23	GS, Thety-ki	= 31
LO, Unty	= 8	CO, Duty	= 16	GO, Thety	= 24	PO, Foty	= 32
PL, Foty-un	= 33	PL, Paty-un	= 41	SL, Sety-un	= 49	SL, Kity-un	= 57
PC, Foty-du	= 34	PC, Paty-du	= 42	SC, Sety-du	= 50	SC, Kity-du	= 58
PG, Foty-the	= 35	PG, Paty-the	= 43	SG, Sety-the	= 51	SG, Kity-the	= 59
PP, Foty-fo	= 36	PP, Paty-fo	= 44	SP, Sety-fo	= 52	SP, Kity-fo	= 60
PP, Foty-pa	= 37	PP, Paty-pa	= 45	SP, Sety-pa	= 53	SP, Kity-pa	= 61
PS, Foty-se	= 38	PS, Paty-se	= 46	SS, Sety-se	= 54	SS, Kity-se	= 62
PS, Foty-ki	= 39	PS, Paty-ki	= 47	SS, Sety-ki	= 55	SS, Kity-ki	= 63
PO, Paty	= 40	SO, Sety	= 48	SO, Kity	= 56	LOO, Under	= 64

It will be seen by this table that we have no peculiar word corresponding to the "ten" of the denary scale; and this we regard as an advantage, not only in being more systematic, but in giving greater precision of expression and idea. Instead of using the same word to indicate both a place, or local value (as the "ten-place,") and a specific number, we are furnished with two distinct words, — "Ty" designating the place, and "Unty" specifying one in the ty-place, as "Duty" specifies two in the ty-place. All that is needed to carry out this system is to add a table of places.

Notation Table.

Units.	Ties.	Ders.	Tyders.	Sens.	Tysens.
L Un	L0 Unty	L00 Under	L000 Untyder	L,0000 Unsen	L0,0000 Untysen
C Du	C0 Duty	C00 Duder	C000 Dutyder	C,0000 Dusen	C0,0000 Dutysen
6 The	60 Thety	600 Theder	6000 Thetyder	6,0000 Thesen	60,0000 Thetysen
F Fo	F0 Foty	F00 Foder	F000 Fotyder	F,0000 Fosen	F0,0000 Fotysen
P Pa	P0 Paty	P00 Pader	P000 Patyder	P,0000 Pasen	P0,0000 Patysen
S Se	S0 Sety	S00 Seder	S000 Setyder	S,0000 Sesen	S0,0000 Setysen
8 Ki	80 Kity	800 Kider	8000 Kityder	8,0000 Kisen	80,0000 Kitysen

Dersens.	Tydersens.	KALIES.
L00,0000 Undersen	L000,0000 Untydersen	L,0000,0000 Unkaly
C00,0000 Dudersen	C000,0000 Dutydersen	C,0000,0000 Dukaly
600,0000 Thedersen	6000,0000 Thetydersen	6,0000,0000 Thekaly
F00,0000 Fodersen	F000,0000 Fotydersen	F,0000,0000 Fokaly
P00,0000 Padersen	P000,0000 Patydersen	P,0000,0000 Pakaly
S00,0000 Sedersen	S000,0000 Setydersen	S,0000,0000 Sekaly
800,0000 Kidersen	8000,0000 Kitydersen	8,0000,0000 Kikaly

The Unkaly is the eighth (or untieth) power of Unty. Its value is 16,777216; and it requires but one more figure to express this large amount, than is required by the denary scale. A second place of figures is not lost by our new system, — that is, its notation does not exceed that of the common system by two places, until the number

8589,934592 is reached; these 10 figures requiring 12 (namely ↳ and eleven ciphers) in the octonary scale to represent their value. If this should appear surprising to any, it must be remembered, that although at 8, and at 64, an additional figure is required by the octonary system, yet after 10 and 100, the denary also requires this additional figure; and considering this, we shall find that the two scales are *equal* in the number of places occupied, — from 1 to 7, inclusive, — from 10 to 63, inclusive, — from 100 to 511, — from 1000 to 4095, — from 10,000 to 32767, — from 100,000 to 262143, — from 1,000000 to 2,097151, — from 10,000000 to 16,777215, — from 100,000000 to 134,217727, — and for the last overtaking, from 1000,000000 to 1073.741823. After this long continued chase, the octonary scale at the next figure, or 1073,741824, (Under-Kaly) loses a place which is never regained. It may not be uninteresting to add, that this scale does not obtain an excess of *three* places until it reaches the enormous number of 9 trillions, 223372 billions, 036854 millions, 775808, these 19 figures being expressed by ↳ and 21 ciphers. This amount diminished by a single unit, or by the last figure 8 being exchanged for a 7, is expressed in the octonary system by 21 *kis* (8) which would be an excess of only *two* places of figures.

Turning from this comparison of the relative powers of the two scales, to their relative simplicity, as exemplified by the octonary multiplication table, we shall find the contrast here as striking as was their parity on the other hand remarkable.

Multiplication Table.

	2	3	4	5	6	7
2	4	6	10	12	14	16
3	6	11	14	17	22	25
4	10	14	20	24	30	34
5	12	17	24	31	36	43
6	14	22	30	36	44	52
7	16	25	34	43	52	61

The mere inspection of this table,* is sufficient to show, that the time and labor of acquiring it would not be half that required for committing to memory our received form; and this facility of acquisition would include almost a corresponding degree of readiness in its use. Figures, like furniture stored in the chambers of the brain, require a constant attention and arranging, to be kept in state for use; and the amount of care and trouble unconsciously bestowed upon them, must be proportioned to the number of the pieces after which we have to look. We think, therefore, that it is no idle boast to say that a child could be taught a thorough knowledge of the four great rules of arithmetic, and a ready skill in their practical applications, through the octonary system, in one half the time required for obtaining an equal knowledge and skill by the common system. Nor is this simplification of arithmetical operations its only merit. The danger of error increases rapidly with the increasing complexity of the numeric scale; and there is no doubt that our new system would ensure an increase of accuracy, at least equal to its ratio of simplicity. And if to this were added the facility which would result from constructing all our tables of weight and measure upon this scale — (a scale so admirably suited to them,) and thereby entirely discarding the whole tedious and troublesome practice of "reduction," from our Arithmetic, — the economy of time and labor would be something quite astounding.†

* This table might be expressed in our own figures, in the following form, remembering that these figures have all an octonary value:

2 × 2 = 4					
2 × 3 = 6	3 × 3 = 11				
2 × 4 = 10	3 × 4 = 14	4 × 4 = 20			
2 × 5 = 12	3 × 5 = 17	4 × 5 = 24	5 × 5 = 31		
2 × 6 = 14	3 × 6 = 22	4 × 6 = 30	5 × 6 = 36	6 × 6 = 44	
2 × 7 = 16	3 × 7 = 25	4 × 7 = 34	5 × 7 = 43	6 × 7 = 52	7 × 7 = 61

† "It is impossible to estimate with any degree of accuracy," says Mr. Nichol, "the amount of labor annually thrown away by the nation at large, while persisting in performing the manifold computations necessary to its gigantic commerce and industry, by means of a series of tables so needlessly complicated and imperfect as those now in

Our exposition of the subject of numeration has been so extended that neither time nor space will now permit us to illustrate the practical working of the arithmetical system here proposed, as we had intended. It is evident, however, that we are here equipped with a mechanism fully adequate to the resolution and expression of all arithmetical operations. Framed by a strict analogy with our present system, it affords us every facility and advantage that this can boast; and differing from it only in the number of its integers, it relieves us entirely from the difficulties and embarrassments which have ever been the opprobrium of our decimal scale. Merely to exhibit the form and method of our scheme, we may here indicate that the present year "1859" would in the octonary style be expressed 6P0E: — *Thety pader and the.* The diameter of the earth (7,925 miles,) would be expressed L.8€€P: *Unsen, Kity theder sety pa;* or in feet (41,847088) — C,€8P0,P6CP: — *Dukaly, thety kider patysen, foty seder duty-fo.*

We now proceed as rapidly as possible to the application of this improved numeration to the determination and distribution of a system of weights and measures. Of all the systems of metrology yet perfected, or even proposed, that of the French, is in the philosophical character of its standards, as well as in the ingenuity, simplicity, and precision of its details, undoubtedly by far the most admirable, and the most worthy of our imitation. "The French system," says Mr. Adams in the excellent Report on Weights and Measures, from which we have already more than once had occasion to quote, "embraces all the great and important principles of uniformity which can be applied to weights and measures. *But that system is not yet complete; it is susceptible of many modifications and improvements.* Considered merely as a labor-saving machine, it is a new power offered to man incomparably greater than that which he has acquired by the new agency

use. But the waste of time and loss of money must be something quite enormous, while every day it becomes greater and greater. Were the different denominations of weights, measures and money brought into harmony with the fundamental principle of our common arithmetic, it may be safely affirmed that the labor of commercial and professional calculations would be reduced much below one-half of what is now expended in this direction, while the risk of errors would be diminished in a still greater ratio." (*Encyclopedia of the Physical Sciences*, art. Weights and Measures, page 778.)

which he has given to steam. It is in design the greatest invention of human ingenuity since that of printing. But like that and every other useful and complicated invention, it could not be struck out perfect at a heat. Time and experience have already dictated many improvements of its mechanism. But all the radical principles of uniformity are in the machine. . . . *Uniformity* of weights and measures, — permanent, universal uniformity, adapted to the nature of things, to the physical organization and to the moral improvement of man, — would be a blessing of such transcendent magnitude, that if there existed upon earth a combination of power and will, adequate to accomplish the result by the energy of a single act, the being who should exercise it would be among the greatest of benefactors of the human race. The glory of the first attempt belongs to France. France first surveyed the subject of weights and measures in all its extent and all its compass. France first beheld it as involving the interests, the comforts, and the morals, of all nations, and of all after ages. . . . . In freely avowing the hope that the exalted purpose first conceived by France may be improved, perfected, and ultimately adopted by the United States and by all other nations, equal freedom has been indulged in pointing out the errors and imperfections of that system, which have attended its origin, progress, and present condition."

Looking at the French *metre* simply as a practical material standard, (without any reference to its ideal derivation,) the first criticism we would naturally have to make upon it, is that it gives us a measure most unfortunate in its size. Like our own awkward yard stick, it is not such a rule as we can conveniently carry about with us: * it is not such a rule as we would measure our houses

* "Perhaps for half the occasions which arise in the life of every individual, for the use of a linear measure, the instrument to suit his purposes must be portable, and fit to be carried in his pocket. . . . . For all the ordinary purposes of mensuration, excepting itinerary measure, the metre is too long a standard unit of nature. It was a unit most especially inconvenient as a substitute for the foot, a measure to which, with trifling variations of length, all the European nations and their descendants were accustomed. The foot rule has a property very important to all the mechanical professions, which have constant occasion for its use: it is light, and easily portable about the person. The metre very suitable for a staff, or for measuring any portion of the

by, or the furniture within them; it is not such a rule as the draughtsman could employ, or the carpenter cut, or lay off his boards by; it is not such a rule as the mechanic could use in his workshop, or the machinist handle in fitting his engines. In short, as a popular standard, it is utterly useless except on the counter of the draper. Theoretically, it matters little whether our unit of reference be the inch or the mile; but for the practical business of daily life it becomes a matter of the very highest importance, that our unit of measure should be such a one as shall have the most convenient and universal application.

Two standards only have ever had a general use and currency, — the *cubit* and the *foot*. Both derived from the human person, it is natural they should be found the most useful measures for the common wants of the person. The cubit may be said to be almost a natural standard; and it is the most ancient of measures, while it is still prevalent throughout the orient. Universal, or nearly so, throughout the nations of antiquity, — it was the common measure of the Israelites, and is referred to in their earliest records. The ark is measured by cubits (Gen. vi. 15,) and the height of the flood is in cubits. Goliath's height was six cubits and a span. The temple of Solomon is measured in cubits; and walls of cities are measured by the same. (2 Kings xiv. 13.) The foot appears to be a much later standard of measure. Introduced by the Greeks and Romans, it has prevailed in modern times wherever the Roman influence has been felt.*

earth, has not the property of being portable about the person; and for all the professions concerned in ship or house building, and for all who have occasion to use mathematical instruments, it is quite unsuitable. It serves perfectly well as a substitute for the yard or ell, the fathom or perch; but not for the *foot*. This inconvenience, great in itself, is made irreparable when combined with the exclusive principle of decimal divisions. The union of the metre, and of decimal arithmetic, rejected all compromise with the foot. There was no legitimate extension of matter intermediate between the ell and the palm, between forty inches and four. This decimal despotism was found too arbitrary for endurance." — (*Adams's Report on Weights and Measures.*)

* "The cubit was also a primitive measure of length among the Greeks; but at the institution of the Olympic games by Hercules, his foot is said to have been substituted as the unit of measure for the foot-race. Six hundred of these feet constituted the stadium or length of the course or stand, which thenceforth became the standard itinerary measure of the nation. It was afterwards by the Romans combined with the pace, a thousand of which constituted the *mile*. The foot and the mile, or thousand

If the foot has been found a more manageable multiple of both the pace and the fathom or its half — the ell, — than the cubit, we are disposed to regard the latter as the more beautiful and useful rule, and the more convenient unit of length. Certainly the occasions are not unfrequent, when we need the addition of a few inches to our foot-rule to measure common objects. At all events in selecting a standard, adapted to the popular wants, it may be regarded as tolerably manifest, that its length should not be less than a foot, and that it should not exceed two feet, — the common carpenter's rule. The cubit is the mean between these extreme limits.

This consideration brings us to the derivation of the standard. "In all the proceedings" says Mr. Adams, "whether of learned and philosophical institutions, or of legislative bodies relating to weights and measures within the last century, an immutable and invariable standard from nature, of linear measure, has been considered as the great desideratum for the basis of any system of metrology. It is one of the greatest merits of the French system to have furnished such a standard for the benefit of all mankind. . . . . In the establishment of the French system, the pendulum, as well as the meridian, has been measured; but the *standard* was after a long deliberation, after a cool and impartial estimate of the comparative advantages and inconveniences of both, definitively assigned to the arc of the meridian, in departure from an original prepossession in favor of the pendulum." A writer in the Edinburgh Review for Jan., 1807, remarks: "Three different units fell under the consideration of these philosophers, to wit, the length of the pendulum, the quadrant of the meridian, and the quadrant of the equator. If the first of these was to be adopted, the commissioners were of opinion that the pendulum vibrating seconds in the parallel of 45 degrees deserved the preference,

paces, are our standard measures of length at this day. The foot has over the cubit, the advantage of being a common aliquot part of the pace and the fathom; and affords the natural means of reducing the two standard measures of length to one. Its adoption was therefore a great and important advance towards uniformity; and this may account for the universal abandonment by all the modern nations of Europe, of that primitive antediluvian standard of measure, the cubit." —(*Adams's Report on Weights and Measures.*)

because it is the arithmetical mean between the like pendulums in all other latitudes. They observed, however, that the pendulum involves one element which is heterogeneous, to wit, time; and another which is arbitrary, to wit, the division of the day into 86,400 seconds. It seemed to them better that the unit of length should not depend on a quantity, of a kind different from itself, nor on anything that was arbitrarily assumed. The Commissioners therefore were brought to deliberate between the quadrant of the equator, and the quadrant of the meridian; and they were determined to fix on the latter, because it is most accessible, and because it can be ascertained with the most precision." (*Edinburgh Review*, Vol. 9, p 379.) *

That this selection was wise at the time it was made, cannot be doubted. That it would be wiser now to select the equator, can we think be made equally evident. By the modern methods of electro-magnetic determination of longitude, an arc of the equator could now be ascertained with as much accuracy, as one of a meridian, and perhaps with even greater precision. A national, or, what would be far nobler, an international commission, liberally endowed with every needed equipment, for measuring in South America, and in Africa, arcs of the equator,—if possible entirely across either continent; and also (what would be very important) one through the opposite island of Borneo,—is an enterprise due to the enlightened spirit and scientific progress of the age, and would be one worthy of the united wisdom and resources of the three greatest nations of the world. The determination of the precise figure and dimensions of our globe,—that fundamental problem of practical astronomy,—is one of such transcendent importance, that no outlays should be regarded as injudicious or misapplied, that would offer the prospect of even a slight improvement in the accuracy of our results.

The equator is, in the first place, undoubtedly the true girth and measure of the earth; and the circumference should always be understood to be this natural measure, unless otherwise specified. In the next place, the meridian not being a circle (owing to the

* See note C—appended to this Report.

polar flattening of the earth,) no two degrees of its quadrant have exactly the same value; which renders the estimates of its degrees exceedingly awkward. According to the computations of Mr. T. J. Cram, (Silliman's Journal of Science for 1837, vol. 31, page 230,) one degree of latitude at the pole is equal to 69.39759375 miles, while one degree at the equator is only 68.70859375 miles, — a difference of more than two thirds of a mile! In addition to all this there is some reason for doubting whether different meridians are uniform in length and curvature. An arc of the meridian south of the equator, measured in 1752, by Lacaille, (at the Cape of Good Hope) gave very unsatisfactory results.*

But through the reductions of various eminent mathematicians we have now the equatorial circumference of the earth as well and accurately determined as any other measure of it. The two best and most recent determinations of the earth's equatorial diameter, are those of Bessel, and Airy, who, by independent calculations, agree in the value 7925.6 miles, and differ only by 234 feet! Bessel making it 41,847,192 feet, and Airy, 41,847,426 feet. The mean of these results will give us 131,467,196 feet, as probably a very close measure of the earth's equator. We have every reason, therefore, for deducing our standard of measure from this line,— the only true circle by which the earth is circumscribed; — we have none for going back to the irregular meridian.

In no particular has the decimal principle of the French system proved so signal and utter a failure, as in its application to the division of the circle. We have already noticed that the sixth part of the circle is one of its most fundamental divisions, — one which cannot be neglected for any theoretical advantage of adherence to

* The result of Lacaille's measurement made a degree at the Cape of Good Hope nearly the same as in France, ten degrees further from the equator. "On account of the anomalous result of this measure, indicating a dissimilarity of figure in the Northern and Southern hemispheres, doubts have frequently been entertained of its accuracy." (*Penny Cyclopedia*, vol. 25, page 215, art. "Trigonometrical Survey.") "After the lapse of nearly a century, the arc has been lately re-measured under the auspices of the British Government; and an approximate calculation of the observations shows that the greater part of Lacaille's anomaly was produced by *mountain attraction* on his plumb line, (1855.)" (*Encyclopedia Britannica*, 8th edition, vol. 9., page 550, article, "Figure of the Earth," by Th. Galloway.)

system. We have seen, moreover, how admirably our present division of the quadrant into 90 parts or degrees, answers all the various purposes required. In adding ten more degrees to the whole, so as to make an even hundred, the French philosophers sacrificed completely its primary and beautiful relations. The sextant no longer had a possible expression in the centesimal scale. A very brief experiment demonstrated, what should have been clearly anticipated without it, that the new degrees were wholly impracticable. This part of the system was therefore speedily and universally abandoned: * and yet this was really a surrender of the very foundation of the metrical division.

The *metre* had been made the 10 millionth part of the quadrant, that the new degree might just represent 10 myriametres: but the abolition of this ideal degree, left the myriametre (and with it of course the metre) a most inconsequential and unmeaning unit. So that now the kilometre no longer represents a minute, and the decametre, a second, as was its original plan and purpose.

The selection of the meridian, we may observe, necessarily involved a reference to its natural fraction, the quadrant; the distance from pole to equator: but had the equator been the standard chosen, inasmuch as it has no such natural measure, the sextant of it might just as properly have been made the starting unit, as its quadrant. And this would have escaped the principal difficulty: for the sextant will easily supply us with a multiple of the quadrant, — though the latter may not conversely, so readily commensurate the former. Instructed by such distinguished failures, let us then start with the sextant of the equator as our prime unit of measure. We shall thus be able to select a final modulus or rule, mainly with reference to its most desirable length, — no longer trammelled by the compounding of binary and tenary divisions. Ten million metres made the quadrant. Our octonary scale is also fur-

* "The new metrology of France, after trying it [the principle of decimal division] in its most universal theoretical application, has been compelled to renounce it for all the measures of astronomy, geography, navigation, time, the circle, and the sphere; to modify it even for superficial and cubical linear measure, and to compound with vulgar fractions, in the most ordinary and daily uses of all its weights and all its measures." (*Adams's Report.*)

nished with its grand unit (the eighth power of the octade,) which for want of a better name, we have christened *unkaly* [L,0000,0000]. The sextant of the equator is 21,911199¼ feet or 262,934392 inches. This divided octavally into *unkaly* parts, gives us the quotient 15$\frac{3}{7}$ inches; *almost exactly our ideal measure!* Midway between the two great rival standards of olden time, the cubit and the foot,* it seems the very compromise of differences, the harmoniser of conflicting systems, and supplies us with a "module" perfectly suited to every requirement of popular mensuration. It needs but the application of octonary multiples, to complete a metrology simple and unexceptionable.

Before giving the table, however, we think it proper to suggest a slight modification in the divisions of the circle, as a subject controlling, to some extent, the details of our linear measures. Should the degree retain its present value as the 360th part of the circle, we should advocate strongly the employment of this unit of the equatorial circle, as the origin of our new standard of measure. Dividing the degree into *undersen* parts (L00,0000) we should have a module about one inch longer than that previously obtained, and somewhat nearer, therefore, to the ancient cubit. Its exact length would be 16.717 inches.

The number 60, however, approaches so near to the octonary *under*, (64,) that the temptation would be very strong to reduce degrees, minutes, and seconds, to the simplicity of the general notation, unless there appeared some strong reason for retaining the present sexagenary scale. But there is no special occasion for dividing small arcs into thirds or sixths, that gives this ancient and venerable system any advantage comparable to that we should have of adding up, or subtracting degrees, minutes, and seconds by a single operation, instead of resorting as now to reduction. On the contrary, the need of frequent binal division is here, as with other values, very apparent; and in this respect the number 60 is

* As the Milan foot is 15.62 inches, (very nearly the precise length above derived) and as the ancient cubits varied no less from the average standard, that of ancient Rome being 17.46 inches, while the *covid* of China was between 14 and 15 inches, our new standard might be called with propriety either "cubit" or "foot." If either of these designations is to be accepted, we should certainly prefer the "cubit."

very defective, as it permits but two bisections. The mariner's compass affords us a good illustration of the convenience experienced in a continued bisection of angles.* There would therefore be a positive benefit in substituting the number 64 for 60. This would interpolate 4 degrees into the sextant, or 6 degrees into the quadrant; making the right angle to be expressed by 96°, instead of 90°, as at present. This, then, is the table we should propose; in which it will be seen, the present values of arc are not so altered as to disturb appreciably our long established ideas of degree, minute, and second.

Divisions of the Circle.

100	(64)	tertials	make	1 second	=	0″. 823974
100	(64)	seconds	"	1 minute	=	52″, 734375
100	(64)	minutes	"	1 degree	=	$(\frac{15}{16})'$ or 56′ 15″
100	(64)	degrees	"	1 sextant	=	60°
1P0	(96)	degrees	"	1 quadrant	=	90°
200	(192)	degrees	"	the semicircle	=	180°
300	(384)	degrees	"	the circle	=	360°

One obvious advantage of this scale, in addition to its simplification, would be to bring the azimuth compass into harmony with the mariner's compass, by giving them common measures. As the latter divides the quadrant into 8 "points" or "rhumbs," each of these would be 1P° (12 degrees) instead 11° 15′, as at present; and the quarter-point would be 3° (3 degrees) instead of 2° 48′ 45″.

The zodiac, or ecliptic circle has from time immemorial been divided into twelve "signs." This would be found a very convenient unit to be applied to such arcs generally; as would also the smaller unit of its quarter, or 10°, the eighth part of the sextant. As there is no name for this, let us give it the name of "arc," (made technical and specific,) a name not inappropriate,

* The cardinal points dividing the circle into quarters, — each quadrant is divided into halves or octants, — each octant into halves and quarters, called "rhumbs" or "points," (8 in the quadrant,) — and finally, each of these points into halves and quarters; the rhumb or point being 11° 15′, and the quarter rhumb or point, 2° 48′ 45″.

since it is about the smallest arc we can readily distinguish from a straight line. This would give us the following scale:

ℒ0° (8 degrees)	=	1 arc	=	7° 30′
ℙ0° or 4 arcs	=	1 sign	=	30°
𝔅0° or 6 arcs	=	1 octant	=	45°
ℒ𝔒° or ℒ0 arcs or 2 signs,	=	1 sextant	=	60°
ℒℙ0° or ℒℙ arcs or 3 signs,	=	1 quadrant	=	90°

Should the above scheme of graduation for the circle be accepted, it will give an admirable simplicity to our table of lengths, which without further preface is herewith subjoined: —

Table of Linear Measure.

		1 point	=	($\frac{1}{720}$ inch nearly)	0.0038 ins.
ℒ0 (8) points	make	1 line	=	($\frac{1}{33}$ inch nearly)	0.03 "
ℒ0 (8) lines	"	1 nail	=	($\frac{1}{4}$ inch nearly)	0.245 "
ℒ0 (8) nails	"	1 inch	=	(2 inches nearly)	1.959 "
ℒ0 (8) inches	"	1 MODULE	=	(15$\frac{3}{4}$ inches nearly)	1 ft. 3.672 "
ℒ0 (8) MODULES	"	1 rod, or pole	=	3 yds.	1 ft. 5.37 "
ℒ0 (8) rods	"	1 perch	=	27 yds.	2 ft. 7. "
ℒ0 (8) perches	"	1 furlong	=	222 yds.	2 ft. 8. "
ℒ0 (8) furlongs	"	1 mile	=	1 mile, 23 yds.	0 ft. 5. "
ℒ0 (8) miles	"	1 league	=	8 miles, 185 yds.	0 ft. 3. "
ℒ0 (8) leagues	"	1 *degree*	=	64 miles, 1480 yds.	2 ft. 5. "
ℒ0 (8) *degrees*	"	1 *arc.*	=	518 miles, 1286 yds.	1 ft. 11. "
ℒ0 (8) *arcs*	"	1 *sextant*	=	4,149 miles, 1493 yds.	0 ft. 4. "
6 (6) *sextants*	"	the *circumference*	=	24,899 miles, 158 yds.	2 ft. "

The table of lengths proper terminates with the league; the denominations following being those of arc. From the derivation of the standard, however, they coincide with precise measures, and are therefore properly included in the table. The "point" gives a dimension about that of the section of a human hair, or of a very fine grain of sand, and may be considered about the limit of visible magnitude. It is therefore a very suitable origin of linear value, while it is an equally appropriate point of departure for microscopic measurements. The "nail," and the "inch" are not the best terms for designating the new values; and are retained merely

from the difficulty of replacing them. The "Module" would in all human probability continue to be called a "foot"; though it deserves a name more expressive of its standard character. While this new *metre* gives us one of the most convenient rules we could devise, it also supplies us with a highly useful ten-and-a-half-foot measuring pole. But the peculiar beauty of the new Module is, that it precisely corresponds with the *tertial* of the new degree. *Under* Modules make one second; — (the "perch";) — *Under* seconds make one minute; (the "mile") — *Under* minutes make one degree; and *Under* degrees — the Sextant. Or, progressing by the successive squares, — *Unty* Modules make the rod; *Under* Modules make the perch; *Unsen* Modules make the mile; *Unkaly* Modules make the Sextant.

As referred to the French measures, we have for the value of our principal new denominations the following: the "line" = 0.77746 *millimetres;* the "nail" = 6.21975 *millimetres;* the "inch" = 4.9758 *centimetres;* the "module" = 3.98061 *de - metres;* the "rod" = 3.18451 *metres;* the "perch" = 2.54761 *decametres;* the "furlong" = 2.03809 *hectometres;* the "mile" = 1.63047 *kilometres;* and the "league" = 1.30437 *myria-metres.*

For those measures in most common use, that is for those clustering immediately around the Module, it would doubtless be found highly convenient to give denominations to the halves and quarters; and thus conform them to the universal popular tendency to binary divisions. We therefore propose the following supplementary table; — not to be on any account incorporated with the preceding, nor in any respect to modify it; but to retain always its subordinate character.

2 nails	make	1 digit,	=	0.48975	ins.
2 digits	"	1 joint,	=	0.9795	"
2 joints	"	1 inch,	=	1.959	"
2 inches	"	1 hand,	=	3.918	"
2 hands	"	1 span,	=	7.836	"
2 spans	"	1 Module,	=	15.672	"
2 Modules	"	1 ell,	=	2 ft. 7.344	"
2 ells	"	1 fathom,	=	5 ft. 2.688	"
2 fathoms	"	1 rod, or pole,	=	10 ft. 5.376	"

Our tables of area, or of surface measure, would of course be derived directly from our linear measures, by the familiar law of squares.

Table of Square Measure.

⅃0 (8) inches square,	or ⅃00 (64) square inches,	make	1 square Module:
⅃0 (8) Modules square,	or ⅃00 (64) square Modules,	"	1 square rod:
⅃0 (8) rods square,	or ⅃00 (64) square rods,	"	1 square perch:
⅃0 (8) perches square,	or ⅃00 (64) square perches,	"	1 square furlong:
⅃0 (8) furlongs square,	or ⅃00 (64) square furlongs,	"	1 square mile.

For popular purposes, however, it would be necessary, or convenient, to have more numerous denominations of area measure; and a less rapid progression than that of *unders*, given in the above merely geometrical table of perfect squares. We therefore propose to insert intermediate values, so as to give our table the systematic or octonary form.

Table of Area — or Surface Measure.

		1 sq. Module	=	1 ft. 101.615 ins
⅃0 (8) square Modules,	make	1 *sheet*,	=	1 yd. 4 ft. 92.92 "
⅃0 (8) *sheets*,	"	1 sq. rod,	=	12 yds. 1 ft. 23.364 "
⅃0 (8) square rods,	"	1 *plat*,	=	97 yds. 0 ft. 42.9 "
⅃0 (8) *plats*,	"	1 sq. perch,	=	776 yds. 2 ft. 55.3 "
⅃0 (8) square perches,	"	1 *acre*,	=	1 acre, 1370 yds. 1 ft. 10.42 "
⅃0 (8) *acres*,	"	1 sq. furlong,	=	10 acres, 1280 yds. 8 ft. 83.4 "
⅃0 (8) square furlongs,	"	1 *district*,	=	82 acres, 567 yds. 5 ft. 91.27 "
⅃0 (8) *districts*,	"	1 sq. mile,	=	1 mile, 16 acres, 4541 yds. 0 ft. 10. "

The intermediate (alternate) denominations of this table are not *perfect squares;* hence it was thought more correct to assign terms to them indicative of their superficial character without the use of the prefix "square." We observe here one advantage that would result from the radix of numeration being a perfect square. The square root of 8, is 2.828427124; or $\sqrt{⅃0}$,=⅁.6P0⅃⅃8⅃P6; hence this value would represent in any given units, the side of a square, equal to ⅃0 (8) of the square units. Thus the side of a square "sheet" would be ⅁ *Modules*, 6 *inches*, P *nails*, 0 *lines*, and ⅃ *point*. The side of a square "plat" would be ⅁ *rods*, 6 *Modules*, P *inches*, 0 *nails*, ⅃ *line*, and ⅃ *point*. The side of a square "acre"

would be C *perches*, G *rods*, P *Modules*, O *inches*, L *nail*, L *line*, and G *points*. And the side of a square "district" would be C *furlongs*, G *perches*, P *rods*, O *Modules*, L *inch*, L *nail*, G *lines*, and L *point*. A very simple parallelogram is however afforded us, which gives with precision the dimensions of these respective areas. Thus a "district," as a land measure, is a rectangular space of ground, measuring two furlongs in one direction, and four furlongs in the other; an "acre" a similar space of ground, measuring two perches in one direction, by four perches in the other; a "plat," a space measuring two rods in one direction, by four rods in the other; and a "sheet" is in like manner a surface of two Modules by four Modules. This table presents, therefore, the simplest ratios of superficial measure which could be devised; and would be found admirably adapted to every purpose of mensuration. For smaller surfaces, it is probable that the following supplementary table would prove a useful resort:

4	square	nails	make	1	square	digit	=	0.239858	ins.
4	sq.	digits	"	1	sq.	joint	=	0.959433	"
4	sq.	joints	"	1	sq.	inch	=	3.837735	"
4	sq.	inches	"	1	sq.	hand	=	15.350941	"
4	sq.	hands	"	1	sq.	span	=	61.403706	"
4	sq.	spans	"	1	sq.	Module	=	1 ft. 101.615	"
4	sq.	Modules	"	1	sq.	ell	=	6 ft. 118.460	"
4	sq.	ells	"	1	sq.	fathom	=	3 yds. 0 ft. 41.841	"
4	sq.	fathoms	"	1	sq.	rod	=	12 yds. 1 ft. 23.364	"

For measuring volume, we would naturally employ simply the cubes of the preceding denominations; while the contents of such cubic meters respectively, of distilled water at its maximum density, would as obviously furnish the denominations of weight. Throughout these derivative tables, we propose to adopt the MODULE as the universal standard. In this respect we perceive another great superiority in our linear unit, over that of the French system. From the inconvenient size of the *Metre*, it has been made practically a standard only of lengths. The *Are*, (the unit of surface,) is derived, not directly from the *Metre*, but from the *Decametre;* the *Litre* (the unit of capacity) is derived from the

cube of the *Decimetre;* and lastly, the *Gramme* (the unit of weight) is derived from the cube of the *Centimetre.* The contrasted simplicity of our project needs no comment.

Table of Volumes.

		1 cubic nail	=	0.01468	cubic inch.
L0 (8) cubic nails	make	1 cub. digit	=	0.11747	cub. in.
L0 (8) cub. digits	"	1 cub. joint	=	0.93977	cub. in.
L0 (8) cub. joints	"	1 cub. inch	=	7.51817	cub. ins.
L0 (8) cub. inches	"	1 cub. hand	=	60.14537	cub. ins.
L0 (8) cub. hands	"	1 cub. span	=	481.16296	cub. ins.
L0 (8) cub. spans	"	1 cub. MODULE	=	2.22760	cub. feet.
L0 (8) cub. MODULES	"	1 cub. ell	=	17.82085	cub. feet.
L0 (8) cub. ells	"	1 cub. fathom	=	142.56680	cub. feet.
L0 (8) cub. fathoms	"	1 cub. rod	=	1140.53441	cub. feet.

This simple scale of volumes or bulks, derived directly from our smaller linear table, gives a good illustration of the great beauty and convenience flowing out of the employment of a radix of numeration which is a perfect cube. Each of the cubic measures of the above table has for the dimensions of its side 2 of the linear values above it.

Table of Derivitive Measures.

The cubic nail	gives	the	*morsel*	measure,	and	the	*grain* weight.
The cubic digit	"	"	*ligule*	"	&	"	*scrap* "
The cubic joint	"	"	*cup*	"	&	"	*dram* "
The cubic inch	"	"	*gill*	"	&	"	*ounce* "
The cubic hand	"	"	*pint*	"	&	"	*pound* "
The cubic span	"	"	*gallon*	"	&	"	*stone* "
The cubic MODULE	"	"	MODIUS	"	&	"	PONDUS "
The cubic ell	"	"	*but*	"	&	"	*load* "
The cubic fathom	"	"	*cord*	"	&	"	*ton* "
The cubic rod	"	"	*vat*	"	&	"	*keel* "

This table furnishes us with a complete system. It needs but a simple calculation to exhibit our weights and measures in full.

Our measures of capacity, with their respective values are as follows.

Table of Capacity Measure.

		1 minim	=	.488 min.
60 (8) minims	make	1 morsel	=	3.905 "
60 (8) morsels	"	1 ligule	=	31.244 "
60 (8) ligules	"	1 cup	=	4 drs. 9.955 "
60 (8) cups	"	1 gill	=	4 oz. 1 dr. 19.64 "
60 (8) gills	"	1 pint	=	2 pts. 1 oz. 2 drs. 37. "
60 (8) pints	"	1 gallon	=	2 galls. 0 pts. 10 oz. 4 drs. 56. "
60 (8) gallons	"	1 MODIUS, or bushel,	=	16 galls. 5 pts. 4 oz. 7 drs. 35. "
60 (8) MODIUSES	"	1 butt	=	133 galls. 2 pts. 7 oz. 4 drs. 44. "
60 (8) butts	"	1 cord,	=	1066 galls. 3 pts. 12 oz. 5 drs. 56. "
60 (8) cords	"	1 vat,	=	8531 galls. 6 pts. 5 oz. 7 drs. 28. "

Our language is unfortunately but very poorly supplied with terms expressive of capacity; and as the existing names for the smaller liquid measures used by the apothecary ("fluid-drachm," and "fluid ounce,") are exceedingly objectionable, from their reference to the incongruous standard of weight, — we are compelled to reject them, although we have no appropriate denominations to substitute. The word "morsel" is perhaps sufficiently indeterminate to answer the purpose; and the Roman *ligula*, a small measure of about a spoonful, supplies a convenient term, having the same recommendation. The "cup," which is equally indefinite, represents about a half-ounce. The *Modius* of the Romans was about the quarter of a bushel: the term has been selected as a suitable one for indicating a standard *measure*, and also as suggesting its dimension, as the cube of the Module. The circumstance that it is here applied to a much larger volume than it was originally, is comparatively unimportant. The "cord" may very well be used in an extended application, — in the absence of any more suitable term that can readily be suggested. It expresses here a volume about one-tenth greater than the cord used as a wood measure.

As referred to our common table of "dry measure," as it is called, the new "pint" is equal to 1.79 pints: the new "gallon" is equal to 7 quarts and one-third of a pint; — or about one-twelfth

less than a peck: the new "Modius" — or "bushel," contains 3849.3 cubic inches; and is therefore equal to one bushel, 3 pecks, 1 quart, and one-half a pint, — or to very nearly 1¼ bushels, — the U. S. bushel containing 2150.4 cubic inches: the new "butt" is equal to 14 bushels, 1 peck, 2 quarts, and half a pint, (being about one-fourth more than the English butt of 2 hogsheads;) and the new "cord" is equal to 114 bushels, 2 pecks and 2 quarts.

In the French measures, our "pint" is very nearly equal to the *litre*, — being .9855 of a *litre;* our "gallon" = 7.884 *litres;* and our "Modius" = 63 *litres.*

It may not be out of place to mention here, (as exhibiting an interesting and very early anticipation of our octonary scale of measures, in England,) that by the act of 51st. Henry III,— (1266) it was declared that "8 pounds [of wheat] do make the gallon of wine, and 8 gallons of wine do make a London bushel, and 8 London bushels do make the quarter."

Our proposed system of weights forms but a corollary from the preceding table of capacity measures; — a Modius of pure water forming the standard unit, — which we therefore call our *Weight* or *Pondus.* By the best recent determinations, one cubic inch of distilled water at maximum density, (or 39¼ degrees, Fahrenheit,) weighs 252.8 grains Troy.* The Modius or cubic Module would therefore weigh 973104.697 grains; or 139 pounds avoirdupois, and 104.7 grains. This will give us the following table:

Table of Weights.

	1 mite	=		0.464	grs.
℔ (8) mites	make 1 grain	=		3.712	"
℔ (8) grains	" 1 scrap, or scruple,	=		20.096	"
℔ (8) scraps	" 1 dram	=	(avoirdupois) ½ oz.	18.824	"
℔ (8) drams	" 1 ounce	=	4 oz.	150.595	"
℔ (8) ounces	" 1 libra, or pound,	=	2 lbs. 2 oz.	329.76	"
℔ (8) libras	" 1 stone	=	17 lbs. 6 oz.	13.08	"
℔ (8) stones	" 1 PONDUS, or Weight,	=	139 lbs.	104.7	"
℔ (8) PONDUSES	" 1 load	=	1112 lbs. 1 oz.	400.	"
℔ (8) loads	" 1 ton	=	8896 lbs. 15 oz.	138.	"
℔ (8) tons	" 1 keel	=	71175 lbs. 10 oz.	220.	"

* This is a trifle more than the value adopted by Mr. Hassler, for the U. S. standards; his experiments giving 252.745 grains to the cubic inch.

While the "Pondus" is the standard of determination, the pound, as the unit of weight in most common use, would be the secondary or derivative standard. Since *Under* "pounds" make the "Weight," this corresponds to our present hundred weight. To prevent any confounding of the "Pondus" and its derivative "pound," we should prefer the restoration of the old word "*libra.*" The "load" is not quite half a ton: and the new "ton" is very nearly 4 tons.

The "keel" is one and a half times larger than the English keel (a weight used only for coal,) which is equal to 21 tons, 4 cwt.; and of which twenty make a "ship-load." Or the English keel is two thirds of our "keel" as above given.

Estimated by the French weights, our "scrap" = 1.924 *grammes;* our "dram" = 1.5393 *decagrammes;* our "ounce = 1.2314 *hectogrammes;* and our "libra" or pound = .98514 *kilogrammes.*

It would probably be found convenient to distribute the more popular or frequently used weights (those from the "scrap" or "scruple," to the "libra,") upon the binary scale: but as the divisions of halves and quarters practically accomplish this, it seems hardly necessary to suggest a series of intermediate denominations.

An entire remodelling of our coinage would of course be necessary under our octonary system. That such a remodelling is really very much needed, — notwithstanding the vaunted excellence of our currency, and its real superiority to that of almost every other nation, — may, we think, be very clearly shown. The universal prevalence of binary divisions rendered necessary by the wants of trade in all its departments, and the signal inability of the established system of coinage to meet such want, has already been alluded to in an early part of this Report. As specie is merely the representative of value, the proportions of it required in exchange for commodities, must of course be determined by the necessary or convenient divisions of the commodity, and not by the size of the pieces which make the money. If the two are incommensurable, a sacrifice is demanded. Of the smaller articles usually sold in packages, a dozen, forms the most common measure; but we are aware of no single article being usually put up by tens

in correspondence with the coins which are to purchase them. Even articles of furniture, such as chairs, plates, cutlery, &c., are generally sold by the dozen, — but never by the decade.

In the subdivision of articles, either by weight or measure, the universal requirement is that of *halves* and *quarters*; — never that of fifths or tenths. Hence it results of necessity, that prices must have the same bi-sections; without any reference to the arbitrary and oppressive though impotent exactions of a decimal regency. If we select any familiar article sold by the druggist,— for example, bicarbonate of soda or tapioca, worth a quarter of a dollar a pound, — it is plain that in the present state of our coinage, it is impossible for a purchaser to pay for half a pound. But the half pound must be had, and so it must be paid for either by 12 cents or by 13. The continued bi-sections of our dollar, actually required in the business of the shop in almost every branch of trade, give us 12½ cents for the eighths, 6¼ cents for the sixteenths, and 3⅛ cents for the thirty-seconds. As none of these fractions are in use, they are necessarily sacrificed on the one side or the other, — and by no means in a way to equalize the exaction; for it is a settled principle of finance with some establishments — both large and small, never to lose the half-cent; nay, even to secure the over-charge of three-quarters of a cent, rather than surrender the quarter. So that by the popular arithmetic of trade as taught by those who seem to be most "knowing," we learn that the subtraction of six from twenty-five, leaves eighteen as a remainder.

The gradual withdrawal of the Spanish and Mexican eighths and sixteenths of our dollar from circulation, has been productive of much inconvenience; * and has of course done nothing towards

* Mr. Adams, writing under a different state of things, when half cents were common, and Spanish "fips" and "levies" abundant, remarks: "These eighths and sixteenths form a very considerable proportion of our metallic currency: and although the eighth dividing the cent only into halves, adapts itself without inconvenience to the system, the fraction of the sixteenth is not so tractable; and in its circulation, as small change, it passes for six cents, though its value is six and a quarter, and there is a loss by its circulation of four per cent. between the buyer and the seller. For all the transactions of retail trade, the eighth and sixteenth of a dollar are among the most useful and convenient of our coins; and although we have never coined them ourselves, we should have felt the want of them, if they had not been supplied to us from the coinage of Spain." (*Report to Congress on Weights and Measures.*)

effecting the substitution of our native dimes and half-dimes, as had been vainly imagined by some. Our [current prices seem to now embrace almost every figure *except* the decimals; 3 cts., 6 cts., 9 cts., 12 cts., 13 cts., 18 cts. and 19 cts, are the common rates below the quarter of a dollar; and above it we have 31, 37, 38, 44 (sometimes shaved down to 43,) 56, 62, 63, 69, 75, 81, 87, 88, and 94 cents; but *never* the 30 cts., 40 cts., 60 cts., 80 cts., or 90 cts., decreed for us by our legislators. In view of these incongruous conditions, it cannot require argument to recommend the simple Money Table we here propose.

Money Table.

Denominations.		Dollar value.	Proposed value.
1 penny	=	.01$\frac{3}{16}$ cts.	.01$\frac{1}{2}$ cts.
10 (8) pennies make 1 groat or bit	=	.12$\frac{1}{2}$ cts.	.15 cts.
10 (8) groats " 1 dollar	=	$1.00	1.19\frac{2}{15}$
10 (8) dollars " 1 real	=	$8.00	9.59\frac{1}{2}$
10 (8) reals " 1 eagle	=	$64.00	76.73\frac{3}{5}$

(*Under* "pennies" make the "dollar"; *under* "dollars" make the "eagle.") The middle column of the table represents the respective value of each denomination on the assumption of the present dollar as the standard. Our scheme contemplates, however, a much more radical improvement than this; great as this alone, would undoubtedly be. The broom of reform must sweep clean; and we must not stop so long as there appears the possibility of a further improvement. The trouble and inconvenience of a transition is no greater to a perfect system than it would be to an imperfect one.

Accordingly we would have in the first place, the standard of purity elevated, and made permanent; and have it expressed in octonary terms. We would have the mint standard fixed at 22$\frac{1}{2}$ carats fine, to 1$\frac{1}{2}$ carat alloy, both for gold and silver: — that is, $\frac{1}{18}$ of pure gold, or of pure silver, to $\frac{1}{18}$ of base metal,— or in our octonary values, — *Kity fo* (HF) parts pure, to *fo* (F) parts alloy,

in *under* (UOO) parts of coined metal. This standard we would have made *invariable*, — placed if possible under the protection of the constitution, — to be changed or debased on no pretence.

In the next place, we would make *gold* the permanent standard of value ; and would make its coins exact weights, and measuring exact lengths ; — these also of course to be permanent and invariable. The silver coins would fluctuate slightly in value, according to the current rate of the metal as compared with gold. To preserve their denominational values, the weights of the coins might be adjusted every octade, or eight years : — the diameters of the coins, however, not to be altered, unless the comparative values of the two metals should change considerably : — the ordinary adjustment of weight being effected by modifying the thickness merely of the coins. Our highest coin — the "eagle" (new style) we would make to weigh exactly 8 "drams," or 1 "ounce," (new style ;) and its diameter exactly 8 "nails," or 1 "inch," (new style,) — as we find this would give a coin of nearly the same proportions (or relation of thickness to diameter) as our present eagle. Of the 8 "drams," one half a dram or 4 "scraps" would be (as before indicated) alloy ; the remaining 7½ drams being pure gold. Such a coin we find by calculation would be worth $76.73⅛ cts. Hence is derived the second series of values, found in the last column of the above table.

To preserve the same proportions of diameter to thickness in all the gold coins, our octonary scale gives us a very simple ratio ; for as the diameters of the coins would be as the cube roots of their bulks or weights, — it results that a gold coin eight times as heavy as the eagle should have exactly twice its diameter ; or on the other hand, that one an eighth of its weight should have exactly one half its diameter. The "real" is such a coin, and would therefore be exactly 4 "nails" in diameter, if its thickness were also one half that of the "eagle." Here we perceive once more the beauty and convenience of having the radix of numeration, a perfect cube ; as is our *unty* (UO). One very great advantage of the system here proposed, is that it would supply the people with a scale of highly useful practical weights, and with a constant

reference to original or national standards. Another benefit, no less striking, is that it would give them on the other hand, the most convenient means of determining the genuineness of the currency, and thus provide an increased security from the impositions of the counterfeiter.

The silver coins should obviously be on a different scale of size; so that no two coins should have the same diameter. A very suitable size for the "dollar" would be 6 "nails," and of course in like manner the "groat" would be 3 "nails." In our present coinage silver is just 16 times heavier than gold, the alloys being the same and the values the same. This would make our new "dollar" weigh 2 "drams" (new style.) But as this weight could not be permanently maintained, (the barometric scale of silver being, as before remarked, liable to fluctuations,) we shall mark it with a "more or less."

On an octonary scale, all the subordinate coins required for representing all possible values, would be merely halves and quarters. Here, again, we perceive another beauty in our system, that it gives the maximum range of expression, with the minimum number of pieces. As we have five different coins in our table, a half and quarter to each would give us fifteen pieces, of which 6 would be in gold, 6 would be in silver, and 3 would be in copper. The "dollar" should be coined only in silver. We here have a distribution of moneys on a purely binary scale, (that scale which has been found to be of all others the most beautiful, and the most convenient) and running through a range of value considerably greater than is to be found in any nation — a range of binary progression perfect and unbroken, from the farthing to the sixteen pounds sterling. A more simple arrangement, or one more suited to the popular necessities, and more easy of popular comprehension and acquisition, cannot be devised. With these preliminary conditions and determinations, we are prepared to give the following table of our proposed coinage:

Table of Coins.

	Coins.	Size.	Weight.	Value.
Copper.	Quarter-penny	2 nails, 2 lines		$\frac{1}{256}$ of a cent
	Half-penny	2 nails, 6 lines		$\frac{1}{128}$ of a cent
	Penny	3 nails, 4 lines		.01$\frac{1}{2}$ cts.
Silver.	Quarter-groat.	1 nail, 7 lines	(4 grains, ±)	.03$\frac{1}{2}$ cts.
	Half-groat	2 nails, 3 lines	(1 scrap, ±)	.07$\frac{1}{2}$ "
	Groat	3 nails	(2 scraps, ±)	.15 "
	Quarter-Dollar	3 nails, 6 lines	(4 scraps, ±)	.20$\frac{39}{40}$ "
	Half-dollar	4 nails, 6 lines	(1 dram, ±)	.59$\frac{19}{20}$ "
	Dollar	6 nails	(2 drams, ±)	1.19\frac{9}{10}$ "
Gold.	Quarter-real	2 nails, 4 lines	2 scraps	2.39\frac{1}{2}$
	Half-real	3 nails, 2 lines	4 scraps	4.70\frac{1}{2}$
	Real	4 nails	1 dram	9.59\frac{1}{2}$
	Quarter-eagle	5 nails	2 drams	19.18\frac{3}{4}$
	Half-eagle	6 nails, 4 lines	4 drams	38.36\frac{3}{4}$
	Eagle	8 nails	1 ounce	76.73\frac{3}{4}$

Our new "penny" is very nearly equal to the English penny; having $\frac{63}{64}$ of its value; — that is, our new "dollar" is just equal to 63 English pennies, instead of the 64 pennies of our table. The French value of our "penny" is $10\frac{5}{9}$ centimes. Our new "groat" is about double the English groat, being $7\frac{1}{2}d.$ or $81\frac{1}{4}$ centimes, French. Our new "dollar" is equal to 5*s.* 3*d.* English; or 6 francs, 50 centimes, French. Our new "real" is equal to 2£ 2*s.* English; or 52 francs (2 napoleons, 12 francs,) French. And our new "Eagle" is equal to 16£ 16*s.* English; or 416 francs (20 napoleons, 16 francs,) French.

We shall here present the monetary system suggested by Mr. Adams, in his able Report on Weights and Measures, to which we have been so much indebted, in order that the great superiority of the plan above detailed wherein it differs from that of Mr. Adams may be made apparent, and that the weight and authority of his name may be adduced wherein the projects agree.

"If it were the duty of this Report to present a system of

weights, measures, and coins, all referable to a single standard, combining with it, as far as possible, the decimal arithmetic, and of which uniformity should be the pervading principle, without regard to existing usages, it would propose a silver coin of nine parts pure and one of alloy: of thickness equal to one-tenth part of its diameter; the diameter to be one-tenth part of a foot, and the foot one fourth part of the French metre. This dollar should be the unit of weights, as well as of coins and of accounts; and all its divisions and multiples should be decimal. The unit of measures of capacity should be a vessel containing the weight of ten dollars, of distilled water, at the temperature of ten degrees of the centigrade thermometer; and the cubical dimensions of this vessel should be ascertained by the weight of its contents; the decimal arithmetic should apply to its weight, and convenient vulgar fractions to its cubical measure. This system once established, the standard weight and purity of the coin should be made an article of the constitution, and declared unalterable by the legislature. The advantage of such a system would be to embrace and establish a principle of uniformity with reference to time which the French metrology does not possess. The weight would be a perpetual guard upon the purity and value of the coin. No second weight would be necessary or desirable. The coin and the weight would be mutual standards for each other; accessible at all times to every individual. Should the effect of such a system only be, as its tendency certainly would be, to deprive the legislative authority of the power to debase the coins, it would cut up by the roots one of the most pernicious practices that ever afflicted man in civil society. By its connection of the linear standard with the French metre, it would possess all the advantages of having that for a unit of its measures of length, and a link of the most useful uniformity with the whole French metrology."

When we consider the decided testimony Mr. Adams has borne against the fitness and utility of a decimal metrology, and the clear manner in which he has himself presented its disadvantages, we must regard the scheme he has here suggested, rather as a reluctant assent to a choice of evils, than as the matured and satisfactory determination of his deliberate judgment. In our opinion, a

reference to the French *metre*, as a standard, would be in almost every respect objectionable, unless we accepted with it the entire metrical system. The fourth part of the metre, or the ten-inch rule, we regard as a much less convenient popular measure, than would be its half, or the twenty-inch rule: as we have already expressed our conviction that the cubit of 18 inches comes probably nearer the average of a maximum utility, than any other of the scales which have hitherto been in common use. Nor do we believe that the system itself, in its present form possesses the elements of a general ascendency, or even of a permanent establishment. When in a succeeding generation, the admiration naturally excited by a new and beautiful mechanism shall have subsided to a more impartial and experienced estimate of its defects, as well as of its admirable features, it will, doubtless, through the inevitable laws of human nature, undergo many and very important modifications, unless indeed some phœnix from its ashes shall arise and be judged worthy to replace it.

But there is an objection even stronger than any we have yet noticed, to accepting the metre, either directly or indirectly, as our national standard of length; and that is the want of absolute precision in the rule itself. It has been shown by the investigations of able mathematicians, that in consequence of a slight oversight in an early stage of the tedious and complicated reductions required, (unfortunately not detected until after the complete organization and establishment of the national standards of weight and measure,) the metre is not an exact expression of its theoretical value.* The

* "It appears that through inadvertence, or the misapprehension of a formula, the distance between the parallels of Montjouy and Mola (the station on Formentera) was computed without applying the proper correction for the convergence of meridians. The distance originally given by the commissioners was 153605.77 *toises;* but the distance when the computation is correctly made is 153673.61 *toises.* (*Bessel's Astronomische Nachrichten*, No. 438,) the difference being 67.84 *toises*, [about 434 feet.] In consequence of this correction, and of the introduction of some other arcs since measured, into the data for determining the figure of the earth, the length of the quadrant of the meridian expressed in terms of the legal *metre*, according to the best determination which can at present be made, of the dimensions of the earth, is 10,000855.76 *metres;* in other words the legal *metre* would require to be lengthened by about the .00000856 part of itself in order to agree with the ideal *metre*, a ten millionth part of the quadrant of the elliptic meridian." (*Penny Cyclopedia*, vol. 25, page 216,—article, "*Trigonometrical Survey.*")

distance from the pole to the equator on a meridian line, was computed to be 5,130740 toises, (the toise being 6 $\frac{4}{10}$ feet, or more exactly 6.394219 feet,) and the length of the metre was definitely declared by the National Assembly, in 1799, to be 443.29596 lines of the *toise du Perou.* "Later and more extensive measurements," says Mr. Guyot, "in various parts of the globe, however, seem to indicate that this quantity is somewhat too small. The latest and most exact results we now possess, combined and computed by Bessel, would make the quarter of the meridian 10,000856 metres, and the metre = 443.29979 Paris lines: Schmidt's computation would made it 443.29977 lines, and both numbers are confirmed by Airy's results." (*Tables, &c., by A. Guyot, Smithsonian Publication.*) The metre is, therefore, too short by .00383 of a line; a deficiency which cannot be regarded as trivial. An error of $\frac{1}{30000}$ of an inch in 40, though wholly inappreciable to the dry-goods dealer, is to the astronomer an amount of serious import; and even to the refinements of our mechanical art, is a discrepancy of more than three times the quantity which can be distinctly measured.* This unfortunate and vital defect in the French metre nullifies almost entirely its value as a natural standard; and defeats that principal object of its establishment, — the facility of its perfect restoration in all future time, should the existing material standards be destroyed.

In the new standard of length, proposed and developed in this Report, we believe that every excellence of the French standard has been carefully preserved, and all its imperfections as successfully avoided. Starting from the same general principles by which that was obtained, we have made no departure from the details of its derivation, not required by the plainest and soundest deductions of experience, philosophy and common sense. Does the French method propose an *aggravated* yard as a convenient unit,

* We learn from the department of "Weights and Measures," at Washington, under the Coast Survey Bureau of the United States, that the hundred-thousandth of an inch is a measure of accuracy easily recognized by the delicate instruments introduced by the ingenious mechanical artist, Mr. Joseph Saxton, who is in charge of this department; and that even this limitation is imposed solely by the uncertainties of the temperature correction.

we show the superiority of the cubit. Does it (on good grounds, at the time) select an elliptical meridian, as its origin of measure, we show still better grounds for preferring the equatorial circle. Does it look (almost necessarily) to the quadrant as a natural unit, we show the greater propriety of the sextant. Does it rest on a thoroughly decimal basis, we show the most cogent reasons for adopting an octonary distribution. Does it find a fitting divisor only in the seventh power of its decimal radix, — we accidentally find it in a great arithmetical unit — the eighth power of the octade. Does it finally give as its finished product, an imperfect *metre*, we offer for acceptance a perfect *Module*.

The system of metrology derived from this new standard, has in it nothing that is arbitrarily assumed. Each part of it is dependent upon every other, and each part flows from each, by a logical and systematic necessity. The whole is thus a perfect unit, simple and complete, — comprehending every relation of dimension and of weight, and adequate to every purpose of precision, the minutest as well as the grandest.

There remain one or two other applications of the octonary measure, however, which though incidental, are still of sufficient importance to merit a special notice. If we substitute for the sexagenary divisions of the circle, the scale of *unders*, a very obvious and pressing analogy would require the same substitution in the smaller divisions of *time*. The hour itself, — the twenty-fourth part of the day, is too convenient a unit to be lightly changed. The attempt made by the French metrology to decimalize it, was only a notable failure.* Nor is there any special reason for disturbing it here, since by the octonary notation, there are just *thety* (60) hours to the day. The minutes and seconds may, however, be changed without much inconvenience, and with manifest advantage. The substitution of the number 64 (100) for 60, would make the minute $\frac{1}{16}$ shorter than it now is; and would give us

* "The solar day was divided into ten hours, each of 100 minutes, and each minute of 100 seconds. . . . . The division of the day into a hundred thousand parts, was the first part of the system that was abandoned. It had been decreed as compulsory with the new nomenclature of the calendar on the 24th of November, 1793, (*4 Frimaire* 2,) but this regulation was indefinitely suspended by the law of 7th April, 1795, (*18 Germinal* 3.)" — (*Adams's Report.*)

4096 (L,000) seconds to the hour, instead of the present number, 3600. This would, of course, reduce the length of the seconds' pendulum correspondingly. Assuming the length of the present seconds' pendulum to be 39.1393 inches, we have the proportion, $(4096)^2 : (3600) :: 39.1393 : 30.23417$. Therefore the length of the new seconds' pendulum, (or the octonary pendulum, as we may may call it) is 30.23417 inches, or not quite 2 modules. This modification of the second, would give us the following table of time measure:

Time Table.

	1 second (n. s.)	=	$\frac{225}{256}$	of a sec:
L00 (64) seconds	make 1 minute (n. s.)	=	$\frac{15}{16}$	of a min: or 56.25 s.
L00 (64) minutes	" 1 hour	=	2	"arcs" of rotation.
60 (24) hours	" 1 mean solar day	=	1	rotation.
66 (30) days +	" 1 month	=	1	lunar revolution +.
LP (12) months	" 1 year	=	1	solar revolution.
L0 (8) years	" 1 octade	=	8	years.
L0 (8) octades	" 1 undery	=	64 (L00)	years.

The value of the new style second, decimally expressed, is 0.86328125 sec. As there would be *unsen* (L,0000) seconds in one hour, and *thety* (60) hours in one day, there would of course be *thety-sen* (60,0000) seconds (98,304) in one day. The 365 days, 5 hours, 48 min. and 48 sec. which form the solar year,* would be in the new style PPP days, P hours, 6P min. and 6.6 sec. The new octonary "century" must have a name, let us call it "undery;" then instead of the "18 centuries" of the Christian era, we must say the "*thety-pa underies.*"

As the Barometer is graduated by absolute lengths, the only change involved in the reading of this instrument, would be the simple substitution of the Module divisions, for those of the foot. It would be found convenient, however, to read by "nails," rather than by larger quantities. Thus 30 inches (the average height of the barometer column) is L "Module," 8 "inches," C "nails,"

* According to Lacaille's tables, 365 days, 5 hours, 48 min. 49 sec. According to Bessel in 1830, 365 days, 5 hours, 48 min. 47.8 sec.

and ⊦ "lines;" which would be much simpler in the form of ⊔⊟⊏.⊦ "nails," or *under kity-du* "nails" and a half. The following table exhibits the barometric range by intervals of 4 "nails" (or one inch very nearly) from *under* (⊔00) to *duder* (⊏00) "nails;" that is, from the height of one Module (the half of an atmosphere) to that of two Modules, (or a whole atmospheric pressure.) One inch = 4.0837 "nails;" ⊦ "nails" = 0.97948 inch.

Table of the Barometer Scale.

⊏00	(duder)	"nails"	=	31.344	inches	=	796.127	millimetres.
⊔⊟⊦	(under Kity-fo)	"	=	30.364	"	=	771.248	"
⊔⊟0	(under Kity)	"	=	29.385	"	=	746.369	"
⊔⊟⊦	(under sety-fo)	"	=	28.405	"	=	721.490	"
⊔⊟0	(under sety)	"	=	27.426	"	=	696.611	"
⊔⊦⊦	(under paty-fo)	"	=	26.446	"	=	671.732	"
⊔⊦0	(under paty)	"	=	25.467	"	=	646.852	"
⊔⊦⊦	(under foty-fo)	"	=	24.487	"	=	621.974	"
⊔⊦0	(under foty)	"	=	23.508	"	=	597.095	"
⊔⊟⊦	(under thety-fo)	"	=	22.528	"	=	572.216	"
⊔⊟0	(under thety)	"	=	21.549	"	=	547.337	"
⊔⊏⊦	(under duty-fo)	"	=	20.569	"	=	522.458	"
⊔⊏0	(under duty)	"	=	19.590	"	=	497.579	"
⊔⊔⊦	(under unty-fo)	"	=	18.610	"	=	472.700	"
⊔⊔0	(under unty)	"	=	17.631	"	=	447.821	"
⊔0⊦	(under and fo)	"	=	16.651	"	=	422.942	"
⊔00	(under)	"	=	15.672	"	=	398.063	"

In the application of the octonary scale to the Thermometer, a greater change would be desirable. None of the existing graduations of this instrument can be regarded as being at all satisfactory. The pervading principle of the French metrology, naturally produced the Centigrade scale;* but outside of the decimal sys-

* The Centigrade scale appears really to have originated with Andre Celsius, a Swedish astronomer and mathematician who lived during the first half of the eighteenth century, (from 1701 to 1744.) It is hence very frequently designated as the "Celsius Thermometer." In addition to the scales of Fahrenheit, Reaumur, and Celsius, two others have been devised, which have never gone into use; those of De Lisle, and of Murray. De Lisle made the boiling point 0°, and counting downward made

tem, it has nothing to recommend it. Its degrees are of a less convenient size than those of the Fahrenheit scale; and hence the continued use of the latter in America, and in England, notwithstanding its awkward and arbitrary character.

The time appears now to have nearly arrived for a philosophical graduation of this most important instrument, from the *absolute zero*, so that its degrees shall accurately represent proportional increments of heat. Although this point of "no heat" cannot yet be determined with any precision, there are several considerations which induce the belief that it cannot be lower than 500 degrees below the zero of Fahrenheit. The conclusion arrived at by Clement and Desormes, is that the absolute zero is most probably at —266½° Cent. or at —148°, Fahr.* This would make (448° + 32°) 480° Fahr. below the freezing point; and 180° Fahr, being the interval between that point and the temperature of boiling water, we should have the boiling point by Fahrenheit's graduation, at 660° above the absolute zero. The objection which might be raised to the use of such large figures to express our ordinary temperatures, (as 560°, for the summer heat of 80°) might be easily obviated by the natural suggestion of making the melting point of ice, a high unit, such as *unty-der*, (1000) — so that being the commencement of a new count, it might thus be popularly accounted a zero point; — the *unty-der* unit being suppressed, or

the freezing point 150°. Each of these degrees was therefore $\frac{4}{5}$ of a degree of Fahrenheit. Murray selected the freezing point of Mercury, — 39° Fahrenheit, for his zero, and made its boiling point (661° Fahr.) to be expressed by 1000°. By this system, the point of melting ice would be 101$\frac{2}{7}$°, and that of boiling water, 358$\frac{4}{7}$°; each degree being $\frac{7}{10}$ of a degree Fahr.

* "Clement and Desormes place the absolute zero at—266°.6' C. (—447°.9' Fahr.) partly with reference to a not very probable hypothesis concerning the heat contained in a vacuum, partly from the following considerations: Air at 0° [the freezing point of water] expands for each degree C. of heat superadded, by $\frac{375}{1000}$ or $\frac{1}{266.6}$ and contracts for each degree of heat abstracted, by $\frac{1}{266.6}$. If this law be applicable at all temperatures, the limit of diminution of volume, must be found at—266.6; below this point there can be no further contraction of volume, and therefore no further abstraction of heat. Or, if 266.6° of heat be imparted to air at 0° C., its volume becomes doubled; according to the above law, the air when its volume is doubled, must contain twice the quantity of heat which it contains at 0°; consequently at 0°, it must contain 266.6° more heat than at the absolute zero." (*Gmelin's Hand-book of Chemistry; translated by Henry Watts, vol.* 1, *p.* 308.)

always understood. If we accept this figure experimentally, in order to ascertain the boiling point of such a scale, we have the simple proportion, 480° Fahr. : L000. (512) :: 180° Fahr. : 600. (192.) This gives us a very convenient number (*theder*) for our new boiling point, and the following scale results:

Table of Absolute Thermometer Degrees.

Absolute.	Fahrenh't.	Centigrade.	Reaumur.	Indications.
600	212	100	80	*Boiling point of water.* (Bar. 30 ins.)
C60	197	91⅔	73⅓	Meconine fuses. Scheererite boils.
CP0	182	83⅓	66⅔	Nitric Ether, Propione, & Metacetone, boil.
CC0	167	75	60	Absolute Alcohol, Camphrone & Acetal, boil.
C00	152	66⅔	53⅓	Water scalds. Wood spirit boils.
L60	137	58⅓	46⅔	Potassium fuses. Bromine boils.
LP0	122	50	40	Metal painful to the touch.
LC0	107	41⅔	33⅓	Fever heat. Spermaceti fuses.
L00	92	33⅓	26⅔	Highest (shade) temperature at London.
60	77	25	20	Mean temperature at Havana and Vera Cruz.
P0	62	16⅔	13⅓	Mean temperature at Rome; and at Mexico.
C0	47	8⅓	6⅔	Mean temperature at Gottingen & Edinburgh.
L000	32	0	0	*Melting point of ice.*
960	17	—8⅓	—6⅔	Oil of turp'tine freezes. Caoutchoucine melts.
9P0	2	—16⅔	—13⅓	Mean temperature at Melville Island.
9C0	—13	—25	—20	Bromine melts. Mean temperature at N. Pole.
900	—28	—33⅓	—26⅔	Lowest temperature at St. Petersburg.

Each degree Absolute = $\frac{15}{16}$ of a deg. Fahr. — or $\frac{25}{48}$ of a deg. Cent. — or $\frac{5}{12}$ of a deg. Reaum.

We have not thought it necessary to present the graduation of this scale by smaller intervals than *duty* degrees, (C0°) nor to extend it above the boiling point, as its rate of progression is sufficiently obvious. This scale is proposed merely as an illustration of the principle of graduation which we think should be adopted; and not, as in the case of the preceding tables, as being a final or permanent result. The estimates of different experimenters, are unfortunately, as yet, considerably discordant; and it will probably

require much more of fine experiment and careful induction, before a concurrence of considerations shall conspire to give us a reasonable confidence in the determination of the absolute zero.* Meanwhile the scale here suggested might be provisionally adopted with advantage, as superior to any of the existing scales, and as probably destined to require no very great modification on the attainment of a more complete knowledge of the subject.

We think that the melting point of ice should be selected as the first great unit or completed period, rather than the boiling point of water. First, because it is less dependent on barometric conditions than the latter; and secondly, because it lies much nearer our ordinary temperatures, and it is more convenient to reckon upward from a fixed point than it is to estimate downward. Should the absolute zero be ascertained to fall considerably below the — 500° of Fahrenheit, then we would recommend the employment of the next higher unit, the *unsen* (ᑕ,0000) to mark the melting point of ice, making the size of the degree to depend (within certain limits,) on the relation of these two points; and allowing the boiling point to fall wherever the arithmetical continuation of the scale should require; unless indeed, the adjustment of a degree or so, at the zero, (which would be of no practical consequence,) should be found to present the accommodation of a simple numerical relation, for the easy conversion of one scale into the other. The limiting conditions we would propose to the size of the degree, would be to select for the notation of the melting point of ice, that unit (of *un* and

* The estimate of Clement and Desormes (480° F. below freezing point,) is however probably near the truth, as it approximates tolerably well to the results derived by various other experimenters, from different data. Thus by Rudberg's experiments, confirmed by Magnus and Regnault, the absolute zero (of gaseous tension) is placed at — 273°.89 Cent., or — 461° Fahr. (493° F. below the melting point of ice.) By J. P. Joule, the absolute zero is placed at — 459° Fahr., (491° F. below the melting point of ice.) (*Philosophical Transactions of the Royal Society, London, for* 1852.) This would make our boiling point ᑕF° (188), or in other words would make our *theder* (600°) four degrees above the boiling point. Had the estimate of Clement and Desormes been 32 degrees lower — that is, had the 480° been below the *zero* of Fahrenheit's scale, instead of its freezing point, it would have made our octonary degrees exactly equal to the degrees of that scale, and perhaps for a provisional scale this would be a preferable notation, as it would involve no change in the graduation of our common Thermometer, but would require only a different reading; the melting point of ice being ᑕ,000 instead of 32, and the boiling point ᑕF (180) instead of 212.

cipher places,) which would give the nearest approach to the present Fahrenheit degree.

The Committee has thus endeavored to unfold with as much conciseness as was compatible with a clear presentation of the subject, what it regards as the best possible method of fulfilling all the varied and difficult conditions required in an acceptable system of weights and measures, as well as the most effectual means of promoting that great desideratum of international commerce, an ultimate uniformity of standards among the nations of the earth. The serious and radical defects of our existing systems have been briefly noticed, and from the experience thus acquired the essential and practical wants of the community have been incidentally pointed out. As the result of this investigation, we can propose no solution of the problem excepting that we have here displayed; nor are we able to discover the counterbalance of any disadvantages which would follow the adoption of this plan, save that of the disturbance and confusion necessarily consequent upon every change, and which must form the price of every valuable reform.

If it be urged that the introduction of still another system of weights and measures, and one having no common unit with either the French, or the English system, would be only adding to the existing diversity of standards, instead of tending to that great scheme of uniformity so cherished by the philanthropist, we have to reply, that, if the system proposed be really of all others the best adapted to the needs, not only of one, but of all nations, then is the prospect of a general uniformity most reasonably to be anticipated *from* its introduction. If neither the metrology of England, (which is also ours,) nor yet that of France, is ever likely to obtain a universal conquest, some better scheme alone remains to give us a hope of ultimate success. Such a scheme we think is here presented. Founded upon the simplest and yet most comprehensive basis, it contains nothing that could be regarded as in any respect peculiar to one locality or latitude, or more suitable for one nation than for any other. Encumbered by no abstruse nomenclature, it aims at no superfluous verbal uniformity, but leaves each people to employ such designations of its units, as may appear to each most easy and familiar.

Mr. Adams, after his unequalled analysis of the English system of measures, in view of its close agreement with our own, discountenances all attempts at a premature innovation. Without approving in his report of the introduction of the French system, he thinks it would afford the best prospect of securing "uniformity;" and remarks, "were it even possible to construct another system on different principles, but embracing in equal degree all the great elements of uniformity, it would still be a system of diversity with regard to France, and all the followers of her system. And as she could not be expected to abandon that which she has established at so much expense, and with so much difficulty, for another possessing, if equal, no greater advantages, there would still be two rival systems with more desperate chances for the triumph of uniformity."

We must avow our belief, on the contrary, that provided a new system could be framed, which *had* demonstrably "greater advantages" than her own, France would be among the first of nations to hail its advent and to welcome its adoption. A nation to which belongs the honor and the glory of having been the first to conceive a great project of international metrology, the first to invite the fraternal co-operation of other powers, and the first to work out with unwearied science, skill and labor, a comprehensive organization of that ideal metrology — unrivalled in its philosophy and symmetry — cannot be the last to appreciate any real improvement of that economy; or to submit to any sacrifice which should promote the realization of such improvement. Nor could the entire abandonment of that which has cost so much, be accounted too great a sacrifice, if only through it could be accomplished that magnanimous design to which it owed its origin. It would have to be looked upon as a costly but invaluable experiment — as a great and necessary progression to an end, by which alone was rendered possible any higher attainment. The system here elaborated is but a development of *that*.

A project which contemplates the entire subversion of the existing arithmetic, with its immense stores of fact and formula, is certainly a most startling proposal; and is one which will doubtless

be regarded by the majority of persons as a scheme chimerical and impossible. We are impressed with a calm conviction that it does not even offer any real difficulty. The enormous labor of re-construction involved, we seek not to deny or to underrate. But this is a trouble which must always be commensurate with the greatness of the reformation. This necessity would, however, most probably stimulate to the development and perfection of that most useful ally, the calculating machine. Rendered simpler in its construction by the very system which should require its services, and made popular and general by the new demand, it seems not improbable that a single century of the octonary empire would place the world on a higher platform than it would even reach without it. Such has been the usual history of difficulty and of success. We believe that a national government has but to *will* it, to ensure its establishment; and after the first impediments of custom were surmounted, we nothing doubt, that the facility and manifold conveniences of the new *regime* would form its most powerful support, and its surest recommendation to popular favor.

If the octonary system have the germ of vitality, which we have here imagined, its adoption by any one of the great nations of Christendom would as surely pave the way to its universal prevalence, as did the introduction of the Hindoo notation, and of the Gregorian calendar. Nor are the obstacles which so long delayed those great reforms, either as numerous or as serious at the present day, as they were in by-gone centuries. The tone and temper of the times,— intellectual, moral and political — differ widely from those of our ancestors; and in our common school system we have a moral mechanism for the inoculation of new truth, untried and unknown in all past ages.* Whenever the octonary numeration

* In the interesting Report made to the Secretary of the Treasury, Dec. 30, 1856, by Prof. Bache, Superintendent of Weights and Measures, it is well remarked, in relation to the facility of introducing a decimal system, that "One generation would nearly suffice to effect this change, if, as in Holland, the new weights and measures were introduced through the schools. The children of the country becoming familiar with them in the primary schools, seeing the actual material standards of length, capacity, and weight at frequent and stated times in early youth, and retaining that familiarity as they passed into the higher schools, would be readily prepared for their universal use when reaching mature life."

should be definitely established by political authority, we would immediately have all young children instructed for a year or two, only in the octonary arithmetic, — as furnishing the easiest and most rational introduction to the knowledge of figures. And not until after a complete mastery of this arithmetic, should they be taught the use of decimals, — still required for a considerable period to enable reductions to be made from the old style to the new. This would be attended with no more labor than is the additional study now of ordinary Algebra; while in the distinctive languages of the two scales would be found a safeguard against all danger or difficulty, in confounding the one value with the other.

The economy of time and labor which the system of octonary computation would infuse throughout the myriad commercial details daily entering into the life of a busy and enterprising people, cannot be estimated, and could not easily be exaggerated. The popular wonder would be no smaller under the daily workings of this wiser system, that decimals could have prevailed so many centuries, — than is our wonder now that the demands of trade could possibly have been satisfied by the awkward and complex Roman scale of numeration.

The objections naturally brought against any disturbance of the existing order of accountancy, (backed on the other hand by the indolent and dilatory plea that we and our ancestors from earliest time have found it to answer quite "well enough,") are precisely those which have uniformly opposed and retarded the introduction of every improvement. We are informed by Sir John Bowring, in his interesting sketch of the Exchequer system of England, that in quite recent times, Lord Granville strongly resisted the abolition of the Latin phraseology, and the substitution of the Hindoo numerals for the Roman, in the keeping of the public accounts, on the ground that the continuance of the accustomed system was necessary to preserve the comprehension of preceding records! *

* "It is indeed scarcely credible, that the perplexing and entangled manner of keeping accounts by the Roman numerals in the same barbarous style which was practised before the Norman Conquest, was maintained at the Exchequer almost down to the present day; and the introduction of the English language and the Arabic num-

The only question upon the subject we can acknowledge as worthy of discussion, is that which regards the beneficial character of the revolution. "Is, or is not, the change proposed, a real improvement?" If it be, — if it be not only an improvement, but of all projected schemes the truest, wisest, best, — then we assert the bolder logic — *its adoption is only a question of time!* Prejudice, timidity, or indolence, — insensibility to the interests of the future, or superstitious reverence for the grey-haired follies of the past, may each or all oppose their ineffectual resistance; they may indeed postpone for a century or two, the benefit to be enjoyed, — they may indeed throw in the scale the added labor of accumulated work to be undone, — but what is "truest, wisest, best," shall surely, in the end, secure its empire.

To the objection urged by some, that the advantages to result are too remote, and that even were the new arithmetic now inaugurated, the present generation could not expect to have the full and peaceful enjoyment of its alleged conveniences, we would reply that such has been the case with every really great reform. We are in possession now of many priceless blessings, whose first and feeble preparations were planned in former, un-enjoying ages. Shall we reap the rich fruits grown from the unselfish providence of ancestral culture, and shall posterity be less favored? Patriotism and humanity reject the doubt. We believe the octonary algorithm to be pregnant with such great and wide-spread benefits, — benefits to extend throughout all coming time, that we should estimate its acquisition cheaply purchased by whole generations of transitional confusion.

The measure we have thus imperfectly advocated in this Report, is by no means a new one. It is an incident of the highest interest and moment in the reign of that distinguished monarch,

erals was successfully resisted by no less a personage than Lord Granville, on the ground that if the barbarous usages of our ancestors were reformed, it would be difficult to understand the accounts, and the records of departed time; and hence he argued for the necessity of perpetuating a system of complication, confusion, and imperfection, not on the common plea of the superior wisdom of our ancestors, but in full acknowledgment and appreciation of the ignorance of the custom which was originally instituted, and which had continued to reign triumphant among the Exchequer records." (*Bowring's Decimal System, chap. 7, p. 124.*)

Charles XII. of Sweden, that he not only contemplated the introduction of an octonary arithmetic, but that he commissioned Swedenborg (at that time celebrated for his scientific and mathematical attainments,) to draw up the necessary details of the plan for establishing this system, — together with an octonary scale of weights, measures, and coins throughout his kingdom.* It appears that the premature death of the king very shortly afterward alone prevented the consummation of this most sagacious and philosophic enterprise. But for this untoward circumstance, this admirable mechanism would have thus been put into practical operation nearly a century and a half ago! Had it proved as successful as there is every reason to suppose it would, — who can estimate the influence this ingrafting would have had upon the present mathematical condition of Europe? Might we not now have been in the full and assured enjoyment of that happier system? The subject of this improved numerical notation had doubtless often occupied the minds of mathematicians, long before this time; but we believe that this is the first occasion on which a deliberate and well designed attempt was ever made to give it a practical existence and establishment. As such, it is an event of no trivial importance, and must be regarded as ever memorable in the history of arithmetical reform.

In contemplating the practical working of this untried system, and forming an estimate of the character of the change required in the popular habits of thought, comparison, and judgment, there can be no doubt that the octonary scale could be generally introduced with far greater facility, and made thoroughly familiar in a much shorter time, in its application to the divisions of money, weight, and measure, than it could be in its more abstract application to the operations of universal numeration. We believe, therefore, that in advance of the arithmetical reformation, it would be found highly expedient to introduce the simple and convenient system of weights and measures here proposed, as the best preparation for the successful introduction of the other.

Even were the octonary arithmetic, (with all its own intrinsic

* See note D — appended to this Report.

excellences) not to be adopted, we still urge that these measures would be worthy of an independent establishment. After the variety of arithmetical reductions to which we are now accustomed under our present incongruous tables, the uniform reduction of a single scale, which would alone be required in the new order, would give a very great simplification and relief; and would in every probability be found upon the whole to entail less inconvenience than that which would remain, with even the perfect decimalization of our various measures. So that even under the disadvantages of a decimal dispensation, we believe it could easily be shown that our new system would still, in view of all the circumstances, be the "best possible" one for popular use, and would most completely furnish the elements of a perfect uniformity.

We have presented the results of our most mature deliberation. With these suggestive representations, our province terminates. As indicated in an early part of this Report, only the authority of Government can give validity to such proposals of reform, whatever their theoretical excellence. For the still more extended and desirable improvement of an *international* uniformity, (the aspiration and the labor of so many among the world's best intellects,) a concert of action among the leading maritime powers, affords the only means of realization. Such a conference among nations having so many fraternal ties, seems called for by every principle of wise philosophy, of generous humanity, and of an enlightened sense of common interest; and surely cannot be regarded, at this day, as a visionary or illusive expectation.

Forty years have now elapsed since the resolution of Congress calling upon the Secretary of State for information respecting the standards of the several States, "and relative to proceedings in foreign countries, for establishing uniformity in weights and measures; together with such a plan for fixing the standard of weights for the United States, as he might deem most proper for their adoption," drew forth the masterly Report of Mr. Adams, from which, in recognition of its standard and authoritative character, we have so liberally quoted.*

* The Resolution of the House of Representatives was passed December 14th, 1819. The Report (extending to 145 pages,) was submitted February 22d, 1821. So that this

With a comprehensive view of all the bearings of the subject, Mr. Adams looked eagerly forward to the establishment of a uniform system of metrology among all enlightened nations. "Would it not be strange," he asks, "if, while mankind find it so easy to attain uniformity in the use of every engine adapted to their mutual destruction, they should find it impracticable to agree upon the few and simple, but indispensable instruments of all their intercourse of peace and friendship and beneficence; that they should use the same artillery and musketry, and bayonets and swords, and lances, for the wholesale trade of human slaughter; and that they should refuse to weigh by the same pound, to measure by the same rule, to drink from the same cup, to use, in fine, the same materials for ministering to the wants and contributing to the enjoyments of one another?"

And yet, with a rare prudence and moderation, believing the time was not then come for any decisive movement, he avoided the tempting occasion offered by the language of the resolution of inquiry, to propose some model scheme; and urged upon Congress, with equal earnestness and wisdom, the avoidance of all attempts at partial and precocious reformation. "In contemplating so great, but so beneficial a change," says he, "as the ultimate object of the proposal now submitted to the consideration of Congress, it is supposed to be most congenial to the end, to attempt no present change whatever in our existing weights and measures. . . . . If there be one conclusion more clear than another, deducible from all the history of mankind, it is the danger of hasty and inconsiderate legislation upon weights and measures. . . . . All trifling and partial attempts of change in our existing system, it is hoped, will be steadily discountenanced and rejected by Congress; not only as unworthy of the high and solemn importance of the subject, but as impracticable to the purpose of uniformity, and as inevitably leading to the reverse, to increased diversity, to inextricable confusion." And accordingly as the result of his laborious investigations, he submits this simple conclusion: "The plan which

elaborate and voluminous work, involving a vast amount of research and of reflection, was prepared in the short space of one year and amid the pressing duties and labors of his high official position. It forms No. 109 of the House Documents of the Second Session of the 16th Congress.

is thus, in obedience to the injunction of both Houses of Congress, submitted to their consideration, consists of two parts, the principles of which may be stated: 1st. To fix the standard, with the partial uniformity of which it is susceptible for the present, excluding all innovation. 2d. To consult with foreign nations, for the future and ultimate establishment of universal and permanent uniformity." In a preceding part of his Report, he remarks: "A single and universal system can be finally established only by a general convention, to which the principal nations of the world shall be parties, and to which they shall all give their assent. To effect this, would seem to be no difficult achievement. It has one advantage over every plan of *moral* or *political* improvement, — there neither is nor can be any great counteracting *interest* to overcome. The conquest to be obtained is merely over prejudices, usages, and perhaps national jealousies. The whole evil to be subdued is diversity of opinion with regard to the means of attaining the same end. To the formation of the French system, the learning and the genius of other nations did co-operate with those of her native sons. The co-operation of Great Britain was invited; and there is no doubt that of the United States would have been accepted, had it been offered. . . . . But this agreement can be obtained only by consultation and concert. It is therefore respectfully proposed as the foundation of proceedings necessary for securing ultimately to the United States a system of weights and measures which shall be common to all civilized nations, that the President of the United States be requested to communicate through the ministers of the United States in France, Spain, and Great Britain, with the governments of those nations upon the subject of weights and measures, with reference to the principle of uniformity as applicable to them."

Thirty-six years later than the date of these suggestions, Mr. Bache, in a report upon the same subject, which may justly be regarded as the natural sequel to the earlier one of Mr. Adams, thus renews this great and important project.

"The first part of Mr. Adams's plan has, as far as legal standards are concerned, in a great degree been accomplished; but the second part, that which recommends the consultation with foreign

nations for the ultimate establishment of universal uniformity, remains yet to be acted on. The importance of the subject cannot but be deeply felt by every one truly interested in the universal brotherhood and substantial improvement of the human race. France was the first to take an important step in the matter, in the projection and final accomplishment of the great work of the measurement of an arc of the meridian passing through her territory, thus giving an ultimate natural standard to which all measures of extension might be referred. To this work she gave the important and universal character which it deserved by inviting the co-operation of all nations. The subsequent adoption of the metrical system, with the metre, the forty millionth part of the circumference of the earth, as the unit of linear measurement, was a great era in the progress of uniformity. True, the progress of science has shown that the metre is not really the forty millionth part of the meridian, as supposed; true that Great Britain has developed an opposition to this national standard which seems almost insuperable, and has been followed by the continental nations in this opposition. The first fact does not necessarily imply a change of unit, though it does point to the failure to realize its true extent; but the second seems conclusive in regard to the necessity for new efforts at international uniformity. . . . . And has not the time arrived, in the general progress of commercial and international intercourse, and the rapid advance of our own country in science, wealth, and power, when her voice should be heard in an important matter like this? Should not Congress make the proposition to all nations to meet by their representatives, and consult for the purpose of establishing permanent and universal uniformity of weights and measures? Such action could not fail to meet with a response due to the greatness of the subject; and, if the great object be attained, to lead to results productive of vast and lasting benefit to the human race."

These propositions, the dictates of an enlightened sentiment of patriotism as well as of philanthropy, commend themselves to the wisdom of those who under our National Constitution, alone have power "to fix the standard of weights and measures."

Respectfully submitted,

ALFRED B. TAYLOR.

NOTE A.

"The triumph of the art of calculation, and that to which mainly the modern system of numeral computation, owes its perfection, consists in the 'device of place,' by which all necessity for distinguishing the nature of the units signified by any symbol is superseded. Like many other inventions of the highest utility, this, when known, appears to arise so naturally and necessarily out of the exigencies of the case, that it must excite unqualified astonishment how it could have remained so long undiscovered. . . . . That the honor of the invention of a system which produced such important effects as well on the investigations of science, as in the common concerns of commerce, should be claimed by many contending nations, is what would naturally be expected. . . . . All Arabian authors on Arithmetic appear to agree that the first writer of that country upon this system of arithmetic, was Mohammed ben Muza, the Khuwarezmite, who flourished about the year 900. This writer is celebrated for having introduced among his countrymen many important parts of the science of the Hindoos, to the cultivation of which he was devotedly attached; and among other branches of knowledge thence derived, there is satisfactory evidence that this species of arithmetic was one. From the time of Mohammed ben Muza, the figures and modes of calculation introduced by him were generally adopted by scientific writers of Arabia, although a much longer period elapsed before they got into common popular use, even in that country. They were always distinguished by the name *Hindasi;* meaning the Indian mode of computation. . . . . At the beginning of the eleventh century, the use of the Arabic notation had become universal in all the scientific works of Arabian writers, and more especially in their astronomical tables. The knowledge of it was of course communicated to all those people with whom the Moors held that intercourse which would lead to a community of scientific research. In the beginning of the eleventh century, the Moors were in possession of the southern part of Spain, where the sciences were then actively cultivated. In this way the use of the new arithmetic was received into Europe first in scientific treatises. A translation of Ptolemy was published in Spain in 1136, in which this notation was used; and after this period it continued in general use for the purposes of science. Notwithstanding the knowledge and practice of this superior notation by scientific men, the Roman numerals continued to be used for purposes of business and commerce for nearly three centuries; and it was only by slow and gradual steps that the improved notation prevailed over its clumsy and incommodious predecessor. The first attempt to introduce it for the purposes of commerce, was made by a Tuscan merchant, Leonardo Pisano, in 1202. Having travelled in Barbary, he there learned the method of Hindoo arithmetic; and struck with its superiority over that to which he had been accustomed, he determined that his countrymen should no longer be deprived of the benefits of it. He accordingly published his treatise in the Latin language; in which he professes to deliver a complete doctrine of the numbers of the Indians. . . . . A considerable period, however, was necessary to introduce this system into the common business of life. The extensive commerce maintained by the Italian States directed their attention to the subject

at an earlier period than other nations; and although for scientific purposes, the date of the introduction of the Arabic numeration into Spain is earlier than that of its appearance in Italy, yet its use for the common business of life, prevailed at a much earlier period among the Italian States, than in any other nation of Europe." (*Lardner's Treatise on Arithmetic*, book 1, ch. 2.)

The Hindoo numerals are found in various manuscripts of Italy, bearing the dates 1212, 1220, 1228. But none are found in England till nearly two centuries later. Chaucer, the poet, who died in 1400, alludes to them in one of his poems, as "the *figures newe*."

According to Sir John Bowring, ("Decimal System:" pages 23–30,) the first calendar in the English language in which the Hindoo numerals are employed, bears the date of "1431," and the earliest date known on a tombstone in these figures is "1454;"—the tombstone being that of "Elen Cook," in the church at Ware. The first English book which bears its date in these figures, is the "*Rhetorica Nova*, Gulielmi de Saona, 1478." And in seals, only one example has been found anterior to the sixteenth century, which bears the date 1484. "The Roman figures lingered longer in England," adds Bowring, "than in any other part of the European world; having found an asylum in the dark and dull regions of the Exchequer," (page 26.) "It is indeed scarcely credible, that the perplexing and entangled manner of keeping accounts by the Roman numerals, in the same barbarous style which was practised before the Norman Conquest, was maintained at the Exchequer, almost down to the present day. . . . . In addition to this strange and absurd system of Exchequer book-keeping, tallies continued to be used down to the year 1782. It was only in the year 1831, that the Committee on Public Accounts, of which I was the Secretary, recommended the utter and complete abolition of the ancient system, and the adoption of the Indian numerals. It was in consequence of this change, that in the year 1835, the *tallies* were ordered to be burnt; a conflagration which led to the destruction of both Houses of Parliament,—the Exchequer in which the tallies were kept, having formed a part of the ancient edifice of St. Stephens." (*Sir John Bowring's Decimal System*, pages 124–125.)

Delambre regards it as a fact humiliating to the pride of human genius, that the discovery of the true notation of number by nine digits and zero should have escaped the sagacity of the illustrious geometers and mathematicians of ancient Greece. "The Hindoos," says Peacock, "consider this method of numeration as of divine origin; 'The invention of nine figures with the device of place being ascribed to the beneficent Creator of the universe.' Of its great antiquity amongst them," he continues, "there can be no doubt, it having been used at a period certainly anterior to all existing records." (*Encyclopedia Metropolitana.*) It can be traced back with certainty at least four centuries before its appearance among the Arabs; and as Lardner well remarks, since "none of these Hindoo authors claim either for themselves or their predecessors, the invention of this method of numeration, but always mention it as being received from the Deity, we may infer that it was practised in that country beyond the limits even of tradition." The Indian origin of our numerals being thus so well established, there is a manifest

impropriety in continuing to designate them as the "Arabic figures," as is constantly done in our school Arithmetics. Let us give honor where honor is due.

NOTE B.

It is remarkable that this binary system, according to the opinion of many, was used in China, four thousand years ago, by Fohi, the founder of the empire. A tablet of great but unknown antiquity, called the Cova of Fohi, marked with a series of variously broken lines, and held in superstitious reverence by the Chinese, as containing the mystery of a divine wisdom, has been found to be completely deciphered by the notation of binary arithmetic. When Leibnitz had extensively circulated his scheme or invention through the various scientific journals, and by means of his own correspondence, — it appears to have found its way even to China, and to have attracted the attention of a Jesuit Missionary at Pekin, named Bouvet. This ecclesiastic, engaged at the time in the study of the Chinese antiquities, discovered, and immediately communicated to Leibnitz with much exultation and enthusiasm, the surprising fact that his system furnished a perfect key to the mysterious lines upon the ancient Cova — hitherto inscrutable, or interpreted only by the speculations of the most extravagant mysticism. The lines of Fohi are arranged in an octagonal form, so as to make the ends approach; — each set of the eight series being disposed on a side of the octagon. These lines transferred from the Cova tablet, and placed in a straight line, are here represented. The row of figures in front expresses the value of each compound symbol, the other figures, which represent the binary notation, manifestly exhibiting a perfect correspondence with the symbols throughout.

0	⚏	000
1	⚎	001
2	⚍	010
3	⚌	011
4	⚋	100
5	⚊	101
6	⚉	110
7	⚈	111

"These figures of eight cova," says Mr. Peacock, (in the *Encyclopedia Metropolitana*) "are held in great veneration, being suspended in all their temples, and though not understood, are supposed to conceal great mysteries, and the true principles of all philosophy, both human and divine."

This inscription is exceedingly interesting as exhibiting a true example of that philosophic notation, the device of the cipher — and the determination of value by place. The absence of any other traces of such a notation in China, and its well-known antiquity in India, where it had been so fully elaborated, would lead to the suspicion that it was to this latter country that Fohi was indebted for this curious record of ingenious thought. It appears that Bouvet was fortunate enough to find subsequently, a Great Cova, in which these markings were carried to a period eight times the extent of the Small Cova. In the *Edinburg Encyclopedia* — (article "Arithmetic") it is stated in reference to this subject, that "Father Bouvet, who first suggested this explanation, and communicated it to Liebnitz, afterwards procured, during his residence in China, the *Great Figure of Fohi*, which extends as far as 64. The exact coincidence which he still found to prevail between the combinations of these lines and the figures of the binary notation, left no doubt with regard to the justness of his conjecture; and we

cannot help remarking that the restitution of the true sense of those characters, after so long an interval of time, is a very singular fact in the history of science."

NOTE C.

It is interesting to trace the history of the gradual development, in modern times, of the grand but difficult project of obtaining from nature a constant and universal standard of length. It is obvious that no such objects of ultimate reference as the human foot, or arm, or cubit, or as "thirty-six barley corns round and dry," can be regarded as natural standards, since they are wholly useless for the purpose of any precise determination. And all measures derived from them are purely arbitrary, as their authority is obtained from positive enactment, merely, and not from any agreement with their nominal originals. Hence it is not at all surprising that "cubits" and "feet" come to signify anything the civil power may enact; the former of these denominations ranging through every gradation of value, from the *covid* of 14½ inches to the royal Egyptian *cubit* of 25½ inches, and the latter from the Pythic foot of 9¾ inches, to the Geneva foot of 19 inches. Nor would it ever be possible from such sources, to reproduce a lost standard, with even the rudest approach to exactness. The necessity indeed for absolute and invariable units of measure, is only felt in a highly advanced condition of science, and of civilization. As Mr. Adams has well remarked, "For all the uses of weights and measures in their ordinary application to agriculture, traffic, and the mechanic arts, it is perfectly immaterial what the natural standard to which they are referable may be. The foot of Hercules, the arm of Henry the First, or the barley-corn is as sufficient for the purpose as the pendulum, or the quadrant of the meridian." (*Report to Congress.*)

"The first attempt at fixing such a standard as should be accurate and universal, both as to place and time, is due to the inventive genius of the celebrated Huyghens. That philosopher demonstrated that the times of the vibrations of pendulums depend on their length only. . . . Hence he conceived that the pendulum might afford a standard or unit for measures of length." (*Edinburgh Review*, vol. 9, p. 373.) It was in his "Horologium Oscillatorium" (published about 1670,) that Huyghens proposed the use of the seconds pendulum as a universal and perpetual measure; this length to be divided into three equal parts; and this third part (about 13 inches) to be called the *horary foot.*

The celebrated Picard, who first measured from Paris to Amiens in 1669, an arc of the meridian in France, making the degree equal to 68.945 miles, (a measurement memorable as having furnished Newton with the means of verifying his grand theory, incapable of determination from the pre-existing data,) also proposed in 1671, in agreement with the idea of Huyghens, that the pendulum beating seconds should be adopted as the unit of length. Picard has the merit of having first thrown out the suggestion, that the diurnal rotation of the earth ought to affect the oscillations of the pendulum, and that it ought to vibrate more rapidly toward the poles than toward the equator. He accordingly tried the pendulum at Uranibourg, at Paris and at Cette, but

was not fortunate enough to discover any sensible difference. Roemer also found the length the same at London.

Richer, however, in the same year, 1671, or early in 1672, while engaged in the duties of his commission at Cayenne, on observing the length of the seconds' pendulum at this place (lat. 4°, 56′ north of the equator,) found it sensibly shorter than at Paris, (48°, 50′ north,) the difference being about a line and a quarter. Richer's discovery that the pendulum varied in length with the latitude, deprived it of that uniform character considered so necessary in a linear *standard.*

The Abbe Gabriel Mouton, a distinguished mathematician who flourished at the same time, appears to be the first who suggested a measure derived from the earth. He proposed, almost simultaneously with the publication of Huygheus, a *decimal system of measures*, based on the value of a minute of arc, as derived from Riccioli's length of a degree. This minute of the degree he called a *miliare*, the thousandth part of which he called a *virga;* equal to 5 feet, $4\frac{1}{2}$ inches. We have here the germ of the present French Metrology.

Cassini, who in 1718 repeated the measurements of a meridian made by Picard, (extending his arc however further south, namely, from Paris to Dunkirk, and making the degree 69.119 miles) proposed the earth's radius as the unit of length. He afterwards in his book *De la Grandeur de la Terre*, proposed as the unit, the six thousandth part of a minute of a degree of a great circle of the earth; a measure very nearly equal to the foot.

In 1748, M. de la Condamine, (who had recently returned from measuring a degree at the equator in Peru,) in a memoir read before the Academy of Sciences, resumed the idea of the pendulum as the unit of length; proposing that it should be taken as beating seconds at the equator, as the most notable line of latitude, and as one likely to avoid all the prejudices which might arise from national jealousy, were the latitude of any particular place selected. We see from this, the anxiety felt to secure a standard which might be common and uniform among nations.

In 1790, Talleyrand proposed to the constituent Assembly of France, that in view of the great diversity and confusion in the weights and measures of the country, a commission should be appointed for the purpose of consulting with a similar commission from the English Government, upon the subject of establishing a uniform international system of metrology, founded upon a single and universal standard. The proposal alluded to the only two natural standards which presented themselves, viz., the measure of the earth and the pendulum, and expressed a decided preference for the latter. The result of this movement was the appointment of Borda, Lagrange, Laplace, Monge, and Condorcet, as commissioners to examine into and report upon the subject. After a careful consideration of the three plans submitted, namely, the pendulum, a quarter of the equator and a quarter of the terrestrial meridian, they very judiciously agreed in decidedly recommending the latter; regarding the pendulum as an unsuitable standard, whether taken at forty-five degrees of latitude or at the equator.

The attempt to enlist the co-operation of England proved abortive. "The operation of changes of opinion there," says Mr. Adams, "is slow — the

aversion to all innovations deep. More than two hundred years had elapsed from the Gregorian reformation of the calendar, before it was adopted in England. . . . After a succession of more than sixty years of inquiries and experiments, the British parliament have not yet acted in the form of law." (*Report to Congress.*)

It was just five hundred years after the statute of 17th Edward II., (A. D., 1324,) enacted that "three barley corns round and dry, make an inch — twelve inches make a foot," &c., before any change was made in the legal definition of the foot. By act of 5th George IV, c. 74, (1824,) it is declared "the standard yard is the distance between the centres of the two points on the gold studs in the straight brass rod now in the custody of the Clerk of the House of Commons, whereon is engraved 'standard Yard 1760,' the brass being at the temperature of 62 degrees by Fahrenheit's thermometer." [This brass standard yard was executed by Mr. Bird, a celebrated optician in 1760.] "The Yard, if lost, defaced, or otherwise injured, may be restored by comparing it with the pendulum vibrating seconds of mean time in the latitude of London, in a vacuum, on the level of the sea, the yard being in the proportion of 36 inches, to 39.1393 inches of the pendulum." This was the first attempt to refer the English foot to a natural standard.

Ten years afterwards, or in 1834, the contingency provided for by this statute actually occurred by the burning of the Houses of Parliament; in which conflagration the celebrated brass standard of Bird was destroyed. Although the only actual legal standard was thus lost, no attempt was made to restore it by the pendulum, as provided by law; but the mean of twelve different standards, including one belonging to the Royal Astronomical Society, which had been constructed and carefully compared with Bird's Imperial Standard, a short time before its destruction, was selected as giving the nearest approximation to the legal standard yard.

A commission was appointed by the British government, in 1838, "to consider the steps to be taken for the restoration of the Standards of Weight and Measure." The Commissioners in their Report, made in 1841, say: "We are of opinion that the definition contained in the Act 5, Geo. IV, c. 74 ss. 1 & 4, by which the standard yard and pound are declared to be respectively, a certain brass rod and a certain brass weight therein specified, is the best which it is possible to adopt. Since the passing of the said act, it has been ascertained that several elements of reduction of the pendulum experiments therein referred to are doubtful or erroneous; thus the reduction for the weight of air was erroneous; the specific gravity of the pendulum was erroneously stated, the faults of the agate plates introduced some degree of doubt, and sensible errors were introduced in the operation of comparing the length of the pendulum with Shuckburgh's scale, used as the representative of the legal standard. It is evident therefore that the course prescribed by the act would not necessarily reproduce the length of the original yard. Several measures however exist, which were most accurately compared with the former standard yard. And we are fully persuaded, that with reasonable precautions, it will always be possible to provide for the accurate restoration of standards by means of material copies which have been carefully compared with them,

more securely than by reference to any experiments referring to natural constants." And the report concludes by recommending "that the standard of length be defined by the whole length of a certain piece of metal or other durable substance, supported in a certain manner, at a certain temperature; or by the distance between two points or lines engraved upon the surface of a certain piece of metal or other durable substance, supported in a certain manner and at a certain temperature; but that the standard be in no way defined by reference to any natural basis, such as the length of a degree of meridian on the earth's surface in an assigned latitude, or the length of the pendulum vibrating seconds in a specified place . . . . That the standard of weight be defined by a certain piece of metal or other durable substance," &c.

It thus appears as the result of this last Commission in England, that the people of that country are disposed to abandon all attempts at obtaining a natural standard, and to recur to the authority of an arbitrary rod or piece of metal, whose length has been derived from prescriptive custom. It should be considered, however, that after a natural standard has been obtained, we still have all the means of its material perpetuation, suggested in the Commissioners' Report. And no foreign community is ever likely to accept as an authoritative unit of measure, a certain brass rod manufactured in England, and incapable of any more precise definition.

In addition to the difficulties of obtaining from the pendulum the re-construction of a lost standard, as above indicated, it is not unimportant to note that there is an original uncertainty in the determination of its length, of nearly the thousandth part of an inch. "We cannot venture to say that the clock's rate in a given day, can be determined certainly to within one-tenth part of a second, although the comparisons have been made at an interval of twenty-four hours. Seeing then that the *free* pendulum is compared with the clock only over a small fraction of the day, it is a great deal to expect that *its* daily rate can be ascertained to within one second of time. A change of one second per day in the rate of a clock, corresponds to a change of $\frac{1}{43200}$, in the length of the pendulum, which is about $\frac{1}{1100}$ of an inch, or $\frac{1}{43}$ of a millimetre; and therefore we may regard this distance as indicating the probable limit of exactitude." (*Encyclopedia Britannica*, 8th edition, vol. 17, p. 384, article "Pendulum," by Edward Sang.)

NOTE D.

The only account we have been able to obtain of the important movement of Charles XII toward superseding the decimal by the octonary system, throughout Sweden, is that contained in a volume entitled "A Compendium of the Theological and Spiritual Writings of Emanuel Swedenborg," (royal octavo,) published at Boston by Crosby & Nichols, 1854. In the life of Swedenborg, prefixed to the "Compendium," it is said, "In 1719 he published four works; first, '*A Proposal for fixing the value of Coins and determining the Measures of Sweden, so as to suppress fractions, and facilitate Calculations.*' After which he was commanded by his Sovereign to draw up an Octonary Computus, (a mode of computing by eighths,) which he completed in a few days, with its application to the received divisions of Coins, Weights and Measures; a disquisition on Cubes and Squares, and a new and easy way of

extracting Roots; all illustrated by appropriate examples." (*Life*, p. 9.) As Swedenborg devised for his "Octonary Computus," both a set of characters, and of new names, we were exceedingly anxious to have enriched this Report with their representation. We have failed, however, to find any clue to these early publications in any of the public Libraries or private collections to which we have had access. The only additional reference to the subject in the volume above referred to, is contained in a letter from Swedenborg to M. Nordberg, written after the death of Charles XII, which appears to detail the monarch's first conception of the project of a reformation in the popular system of numeration. An extract, giving all that relates to the subject of octonary computation, is here copied.

Letter of M. Swedenborg, Assessor of the Board of Mines, to M. Nordberg, Author of the History of Charles XII.

"SIR:—As you are now actually engaged upon the Life of Charles XII, I avail myself of the opportunity to give you some information concerning that monarch, which is perhaps new to you, and worthy of being transmitted to posterity. . . . . Conversing one day with the king upon arithmetic, and the mode of counting, we observed that almost all nations, upon reaching ten, began again; that those figures which occupy the first place, never change their value, while those in the second place were multiplied ten-fold, and so on with the others; to which we added that men had apparently begun by counting their fingers, and that this method was still practised by the people; that arithmetic having been formed into a science, figures had been invented, which were of the utmost service; and, nevertheless, that the ancient mode of counting had been always retained, in beginning again after arriving at ten, and which is observed by putting each figure in its proper place.

The king was of opinion that had such not been the origin of our mode of counting, a much better and more geometrical method might have been invented, and one which would have been of great utility in calculations, by making choice of some other periodical number than 10. That the number 10 had this great and necessary inconvenience,—that when divided by 2, it could not be reduced to the number 1, without entering into fractions. Besides, as it comprehends neither the square, nor the cube, nor the fourth power of any number, many difficulties arise in numerical calculations. Whereas, had the periodical number been 8, or 16, a great facility would have resulted, the first being a cube number of which the root is 2, and the second a square number of which the root is 4; and that these numbers being divided by 2, their primitive, the number 1 would be obtained, which would be highly useful with regard to money and measures, by avoiding a quantity of fractions. The king, after speaking at great length on this subject, expressed a desire that we should make a trial with some other number than 10. Having represented to him that this could not be done unless we invented new figures, to which also names altogether different from the ancient ones must be given, as otherwise great confusion would arise, he desired us to prepare an example in point. We chose the number 8, of which the cube root is 2, and which being divided by 2, is reduced to the primitive number 1. We also invented new figures, to which we gave new names, and proceeded according to the ordinary method; after which we applied them to the cubic calculations, as well as to money, and to measures. The essay having been presented to the king, he was pleased with it." (*Appendix to Life, &c., pp.* 123, 124.)

REPORT ON THE REVISION OF THE PHARMACOPŒIA.

TO THE ASSOCIATION:—

THE undersigned find the task allotted to them rendered difficult from the fact that the subjects submitted for their united judgment, were too numerous to be fully discussed during their limited opportunities of being together. The previous reports on the preliminary revision of the Pharmacopœia, submitted by the several divisions of the large committee at the last annual meeting, were filled with numerous suggestions growing out of local preferences and the limited experience of individuals, which are entitled to small influence in legislating for the country at large; from these we have endeavored to select the most important improvements, though in some instances obliged to take for granted the assent of each other. We have also drawn largely upon the results of our own experience, and upon the observations of practical pharmaceutists recorded in the journals.

As it will be impossible for the Association in its collective capacity to consider the details of this report, it will be necessary to take upon trust most of the improvements proposed, and to give them a tacit sanction in view of their being submitted to the Pharmacopœal Convention. This consideration has limited our disposition to propose innovations, and has induced us to reject many suggestions in the previous reports, which, though valuable contributions to pharmaceutical knowledge, would, if incorporated in this, weaken its influence as an official presentation of the actual demands of pharmaceutical reform.

The convention for revising the Pharmacopœia has never considered the revision in detail, but, recognizing the impracticability of opening subjects requiring such careful and accu-

rate determination to be decided by a mixed assembly, has always submitted the whole work of revision to a small committee, who have bestowed the most rigid scrutiny and weighty consideration upon every detail. In their investigations, your Committee have been impressed with the responsibility of attempting alterations in the National Code, and, influenced by the following principles of action, they desire to hold them up to all concerned in the work.

1st. There should be no important changes in nomenclature or in processes unless imperatively demanded by the requirements of practice or necessary to keep pace with the progress of Pharmaceutical Science.

2d. The Pharmacopœia not being a scientific, but a practical Code, should contain none but the most plain and practicable formulæ; its nomenclature should be maintained upon such a basis as will not be liable to fluctuation, and simplicity and accuracy should be its leading features.

3d. No drug or preparation should be inserted in the Pharmacopœia until it has an extended reputation in at least several localities—except improved forms of preparation for well known drugs.

4th. The Pharmacopœia not being designed to furnish all the combinations called for in practice, should contain only a limited number of extemporaneous preparations which are well adapted to general wants and of utility to both Physician and Pharmaceutist.

Weights and Measures.

Of all the proposed general reforms in the Pharmacopœia, none has excited so much discussion as the proposed change in the system of Weights and Measures; the importance of this subject is increased by the fact that our transatlantic brethren who are now engaged in consolidating the three British Pharmacopœias into one, with the intention of making a national standard which shall come up to the requirements

of the time, have agreed upon a course which will quite disturb the accord which has heretofore subsisted between our own weights and those of two of the British colleges. The proposition agreed upon, is to substitute the avoirdupois weight with the Troy form, so that the weights and measures of the British Pharmacopœia will stand thus:—

20 grains	= 1 scruple	(= 18.22 troy grains)	60 minims	= 1 drachm	(fluid)
60 "	= 3 scruples	= 1 drachm	8 drachms	= 1 ounce	"
8 drachms	= 1 ounce		20 ounces	= 1 pint	
16 ounces	= 1 pound		8 pints	= 1 gallon.	

The *grain*, which has always been the uniform denomination through which the Troy and avoirdupois weights were compared with each other, and calculated into decimal weights, and which has been so universally used in the weighing of small quantities, the statement of doses and for dispensing purposes, is here changed to a decimal, .91145, so as to make 480 grains equal to the former ounce of only 437.5.

In the new system of measurement the minim is changed in the same ratio, though in consequence of the adoption of the Imperial measure of twenty fluid ounces to the pint, the correspondence between the weights and measures only applies to the fluid drachm and fluid ounce.

This arrangement has not been adopted by our transatlantic brethren without a great deal of opposition on the part particularly of the English Pharmaceutists, but we believe it is finally determined on, and in view of the immense importance of a correspondence in the weights and measures between our own and the British Pharmacopœias, it becomes an important inquiry how the question shall be disposed of by us.

Apart from this, the change proposed strikes us as possessing advantages which recommend it to our especial consideration, although the limited discussion it has received as yet in this country, and our want of familiarity with its practical working, makes it premature for us to decide in its favor at present.

The increased popularity among men of science, of the decimal system of measurement and weight now used, especially in France, has led to a wish on the part of some, that, although its adoption in the present Pharmacopœia would be quite out of the question, the choice might be allowed in each formula between the weights and measures made officinal and the equivalent decimal parts in grammes. We do not know that the association would be prepared to adopt such a recommendation and only present the subject here as one which will have to be met by the Pharmacopœal Convention, and on which the opinion of the American Pharmaceutical Association might be appropriately expressed.

Percolation.

The process of Percolation, which is the name we propose to apply to it in the Pharmacopœia, was first introduced into the work in 1840. At that time it was a new invention in Pharmacy, and little known outside the more intelligent circles, so that the Convention and its Committee introduced it with caution as supplementary to maceration in the directions for making tinctures, some extracts and syrups. In the revision of 1850, it was made still more prominent a feature in the work, but in very few instances to the exclusion of maceration. For twenty years this has been gaining ground among us until it has well-nigh become the universal method of extracting the active principles of vegetable substances.

During this time the process has been improved by modifications of the original directions, and only recently by the observations and experiments of members of this association have some of the conditions essential to the most perfect success in its prosecution been arrived at.

We therefore propose to revise the general description of the process, among the Preliminary Notices, in the first part of the work, and as this can not be made to include all the conditions necessary to be described in individual cases, we

propose to give the most exact and specific directions in each formula, describing the coarseness or fineness of the powder by the sieve through which it is to be passed, indicating the proper amount of menstruum to be added before packing in the apparatus, and then with as much precision as practicable the mode of conducting the subsequent parts of the process. In Appendix B, we have given the proposed general description of percolation.

The List.

We propose to add to the *primary* list, 16 items now contained in the *secondary*, to insert 26 new items in the primary, and 15 in the secondary. These will be found in the appendix marked A.

We have included in these changes, the transfer from the preparations, of carbonate of ammonia, ether, chloroform, ethereal oil, oil of amber and glycerin.

These preparations seem so completely out of the range of the shop manipulations as to go appropriately among those articles obtained exclusively from manufacturers who seldom regulate their processes according to the requirements of the Pharmacopœia. It is proposed, of course, to append to each of the names, as they occur in the list, full and accurate descriptions of the properties of the article, with tests for the detection of impurities and sophistications.

This department of detail, we are glad to know, will be specially attended to even in the preliminary revision, the Philadelphia College of Pharmacy Committee having allotted it to a special sub-committee, who will, no doubt, avail themselves of the light thrown on the subject of the ethers and numerous other preparations by Dr. E. R. Squibb, in his able report to this Association last year.

The adoption of a uniform practice in regard to the location of officinal chemicals, whether in the list or among the preparations, though very desirable as a guide to the numerous pharmaceutists and physicians concerned in the revision,

has never yet been attained. Some propose inserting in the list all the chemicals which it is not practicable to make in pharmaceutical stores, as they are usually furnished in this country. This rule would exclude the processes for spirit of nitric ether, the salts of the alkaloids, mercurial mass, and many other preparations which have been long retained in their present position, and could not, it seems to us, be spared without serious detriment to the usefulness of the work.

It has been suggested to give a good working formula for every chemical preparation used in medicine, as an indication to the pharmaceutist that he may prepare it, if desirable; but this course would, we think, greatly increase the bulk of the work, without adding to its value for the purposes of its publication.

We should prefer the rule, if any rule need be adopted, to include in the *preparations* all those chemicals used exclusively in medicine, with such of those used also in the arts, as are readily made on a small scale, and to confine *the list* chiefly to those which are used in the arts and incidentally in medicine.

Perhaps, however, the course heretofore adopted is the safest to leave the decision in each individual case to the committee for the final revision, who will be guided by all the circumstances to a judicious decision.

OF THE PREPARATIONS.

Aceta. — To this class we propose no additions but to modify the formula for *Acetum colchici*, and as in appendix C., 1, and that for Acetum Opii as in appendix C., 2, by the modification in the last named preparation it is increased in strength to three times that of Laudanum, instead of twice, and is rendered more readily practicable.

ACIDA.

We propose to add to this class, the following:

Aqua Acidi Carbonici, to be transferred from the class of medicated waters.

Acidum Nitro Muriaticum Dilutum. — Take of Nitro Muriatic acid, recently prepared, one fluid ounce.

Distilled water, four fluid ounces.

Mix them. The object of this addition is to avoid as far as practicable the well known inconvenience of dispensing the strong acid, and to preserve in solution a larger portion of the gaseous products of the mixture than the small bulk of the strong acid will retain.

Acidum Phosphoricum Dilutum. — Adopt the formula of William S. Thompson, transactions of the Maryland College of Pharmacy, vol. 1., No. 2, and also direct as an alternative, the solution of proper proportion of the glacial phosphoric acid, if made officinal in the list.

Acidum Valerianicum. — This acid may be conveniently made from valerianate of soda, which might be made officinal for this use and with a view to furnishing any other valerianates which it is thought desirable to introduce into the Pharmacopœia.

Acidum Sulphuricum Aromaticum. — We propose a modified manipulation which is less complex, and in the experience of one of your committee, more satisfactory. (Appendix C., 3.)

ACONITIA.

The experiments of Headland. Foot note to U. S. Dispensatory, 10th edition, page 823. Should be carefully repeated by the Committee.

ÆTHEREA.

Æther Fortior. — Introduce this among the preparations under the general head *Ætherea,* adopting the formula of Dr. Squibb. Page 394. Proceeding of 1858.

Collodium. — Among the numerous processes which have been proposed for this preparation, we recommend to the special attention of the Committee on the final revision, the mixed acid process, with the suggestion to use a colored salt mouth bottle to contain the cotton in contact with the acids,

and to protract the immersion for 6 or 12 hours. The necessity of bringing the prepared cotton to dryness seems to be obviated by the use of one fifth strong alcohol, with the ether employed.

Spirit Ætheris Nitrici. — The substitution of a practicable process for this preparation, on the plan on the British Pharmaceopœias, with the details submitted by Dr. Squibb, last year, will, we believe, place this preparation more within the scope of the pharmaceutist, and would be an improvement.

AMMONIA.

Liquor Ammoniæ Fortior. — The strongest solution of ammonia officinal in the list, is entirely too concentrated to be used, or preserved, especially in our hot summers without the rapid disengagement of the gas. We recommend the reduction of the specific gravity to .920 or to such point as that by dilution with an equal portion of water, (not two parts as at present,) it shall give the appropriate strength for ordinary use.

Liquor Ammoniæ, placed among the preparations, should, we think, be made by the wet process given by Dr. Squibb. Page 407, of proceedings of last year.

Spiritus Ammoniæ Aromaticus. — This, we think, should be increased in the proportion of the ammoniacal salt, and should be rendered easy of preparation by the adoption of a formula for the solution of carbonate of ammonia in alcohol and the subsequent addition of the essential oils of cinnamon, cloves, and lemon peel. The specific gravity should be clearly stated in the case of the officinal *spiritus ammoniæ.*

Alcohol Fortior. — We recommend the adoption of a formula for this preparation, to be made from the alcohol officinal in the list, to have the sp. gr. .796. It has the advantage of being purer, as well as stronger, by the rectification necessary to bring it to this specific gravity, and though unnecessary in all the cases in which alcohol is prescribed, it would be useful in several preparations.

Antimonium. — Since the abandonment of the somewhat uncertain and very unscientific Pulvis Antimonialis from the Pharmacopœias, many physicians have experienced the want of a good preparation of oxide of antimony, and within a few years past a definite mixture of the teroxide of antimony and phosphate of lime, has come into use, both in this country and in England, under the name of Tyson's antimonial powder. We suggest the insertion of this or of the undiluted teroxide in the Pharmacopœia. The latter powder, though now little known to physicians, would be useful in the preparation of definite antimonial compounds.

AQUÆ MEDICATÆ.

Aqua Destillata. — Modify this, directing that the water should be boiled previously to adapting the head of the still, or that the first two pints should be rejected.

Aqua Rosæ. — The proportion of rose leaves should be reduced to one-half the present officinal quantity.

We propose to add to the present series —

Aqua Amygalæ Persicæ.

Take of Peach leaves, . . . 2 lbs.
Water, ... 2 gallons.
Mix them and distil one gallon.

Aqua Sambuci.

Take of Elder flowers, . . . 8 lbs.
Water, ... 2 gallons.
Mix them and distil one gallon.

We propose to add as supplementary to the process for each of the following now in the Pharmacopœia, a process for its preparation by distillation from the crude drug.

Aqua Cinnamoni, from Ceylon Cinnamon.
Aqua Fœniculi, from the fruit.
Aqua Menthæ Piperitæ, from the fresh herb.
Aqua Menthæ Viridis, from the fresh herb.

We propose also removing from this class, the officinal Aqua Acidi Carbonici and placing it among the class — Acida.

ARGENTUM.

Argenti Cyanuretum we propose to name Argenti Cyanidum.

BISMUTHUM.

We propose that *subcarbonate of bismuth*, be made officinal among the preparations, with a good practicable formula.

Cadmium. — Sulphate of Cadmium, has a wide spread reputation among oculists, and it becomes a question whether it should not be introduced into the Pharmacopœia.

CERATA.

The improved process for *Ceratum calaminæ*, (appendix C., 3,) is recommended as a decided improvement on the present. Rancidity being avoided and a more perfect union of the calamine in a fine powder, with the unctious ingredients, being accomplished.

Ceratum Plumbi Subacetatis. — An improved formula for this is presented. (Appendix C., 4.)

Ceratum Sabinæ. — We append an improved formula identical in its results with that proposed by Prof. Graham of the Committee last year. (Appendix C., 5.)

Ceratum Saponis. — Modification proposed, (appendix C., 6); this is a more ready process, we think, and at least, equally good in its results.

CONFECTIONES.

Confectio Rosæ. — We propose to substitute the formula marked C., 6.

Confection Sennæ. — We propose to substitute the formula, C., 7.

We would omit the class *Pulpæ* from the Pharmacopœia.

EMPLASTRA.

Emplastrum Ammoniaci Cum Hydrargyro. — We propose a new formula. (See appendix C., 8.)

Emplastrum Opii. — See new formula, (appendix C., 9.)

Emplastrum Picis Cum Cantharide. — We propose to reduce the quantity of cerate of cantharides from 6 ounces to 4 ounces in the officinal formula. As now made, the preparation is apt to blister.

Emplastrum Plumbi. — For 5 lbs. of semi-vietrified oxide of lead in the formula, substitute 4½ lbs., as furnishing a more perfect plaster.

Emplastrum Aconiti. — We propose to introduce the formula for this preparation suggested by Prof. Procter. (American Journal of Pharmacy, vol. 25, page 202.)

EXTRACTA.

We give a new process for the alcoholic extracts of the narcotic plants, &c., in which alcohol is substituted for a portion of the diluted alcohol in the process, and spontaneous evaporation employed instead of that by artificial heat in reducing the alcoholic liquid. This produced a more efficient extract, and where the herb has been carefully dried and preserved, these extracts are believed to be preferable to the inspissated juices of the fresh plants. (See appendix C., 10.)

We recommend the introduction of an *Extractum Cinchonæ Precipitatus* similar to that made the formula of Charles Ellis in vol. xx. p. 15, American Journal of Pharmacy as Extractum Calisayicum, see also Parrish's Pharmacy, 2d edition, p. 186.

Extracta Cinchonæ Rubræ and Flavæ. — A modified formula, appendix C., 11.

Extractum Jalapæ and Podophylli. — A modified formula, appendix C., 12.

Extractum Cimicifugæ to be added, formula similar to foregoing.

Extractum Colocynthidis. — We propose to adopt Dr. Squibb's suggestion upon the admixture of simple extract of colocynth with the other ingredients that make the compound, and hence

propose that this preparation be made officinal, and that the formula for

Extractum Colocynthidis Compositæ should be altered accordingly, being directed in the form of powder exclusively. See proceedings of 1858, p. 411.

Extractum Ignatia Amara. — Make this officinal, to be made by the process for Extractum Nucis Vomicæ, with a provision for the removal of the fixed oil if practicable.

Extractum Opii. — We propose to amend this process, as in the formula, appendix C. 13.

Extractum Rhei. — This preparation is very unsatisfactory by the old officinal process. We append a formula (appendix C., 14) which gives a preparation of a more uniform pilulæ consistence and greater proportional activity.

Extractum Taraxaci. — This extract of pilulæ consistence and elegant quality may be made from the dry root as proposed in the appendix C. 15. This is very practicable by apothecaries, and superior to the common commercial article extractum.

Extractum Gentianæ. — Instead of merely heating the filtered infusion to the boiling point, this process should be modified in accordance with the suggestion of Dr. Squibb, by continuing the boiling so as to effect a more complete separation of the albuminous coagulum or straining. See proceedings of 1858, page 412.

THE RESINOID EXTRACTS.

Of this class we would suggest the adoption of the following in the Pharmacopœia: *Resina Jalapæ, Resina Podophylli.* We are not, however, prepared to recommend formulæ which would be certainly satisfactory. The experience of one of your Committee is in favor of the formula for resin of podophyllum published in Parrish's Pharmacy, 2d edition, page 191.

EXTRACTA FLUIDÆ.

The most extensive additions proposed to the preparations are in the class of Fluid Extracts. In view of the influence of fashion upon the prevailing methods of medical practice, we think a care should be felt by the Convention not to incorporate this element too largely into the Pharmacopœia at present.

No such preparations, with the exception of two or three classed as concentrated Infusions, are known in the foreign Pharmacopœias. A large proportion of those in use among us have originated and have been until very recently made exclusively by manufacturing pharmaceutists to whose advertising they owe their extended use. It is notorious that loose and inaccurate ideas of their strength exist among physicians, and every apothecary of large experience must have met with constant evidences that their general introduction, like unadvised changes in the Pharmacopœia, are calculated to unsettle physicians in their old modes of prescribing without their fully comprehending the new *regime* introduced.

We propose that the following Fluid Extracts should be made officinal in addition to those now in the Pharmacopœia.

Fluid Extract of Buchu.
Fluid Extract of Ergot.
Fluid Extract of Wild Cherry.
Fluid Extract of Cimicifuga.
Fluid Extract of Cinchona.
Fluid Extract of Gentian.
Fluid Extract of Ipecacuanha.
Fluid Extract of Lobelia.
Fluid Extract of Taraxacum. (See appendix C., 16.)

Of those now officinal, we propose to remove the fluid extracts of pepper and cubebs into a separate class to be called *Oleo Resina*. The suggestion that the formulæ for all Fluid Extracts should be so constructed as that the resulting

preparation should represent a fluid ounce to each ounce of the drug, meets our entire approval.

Prof. Procter, having by appointment prepared an elaborate essay on this class of preparations to be read at the present meeting, your Committee omit the suggestions they had intended to offer, referring to his paper, which covers the entire ground of those fluid extracts already officinal and a large number not recognized by the Pharmacopœa from which to select for the purposes of this revision. See, also, Trans. Med. Col. Ph., N. S., Vol. 1, No. 2, for new formula for Fluid Extract of Valerian; and Vol. 1, No. 1, for formula for Fluid Extract of Buchu; also Parrish's Pharmacy, 2d edition, p. 195 to 219.

FERRUM.

Tinctura Ferri Chloridi.—This preparation has occasioned so much difficulty and discussion that the demand for a new or modified formula is imperative; of those proposed, that of Dr. Squibb, which is an adaptation to this preparation, of the process for obtaining pure sesqui chloride of iron, has our preference. See Am. Jour. Pharmacy., vol. xxx., p. 289.

Ferri Iodidum — Liq. Ferri Iodidi. — The officinal processes are very practicable, and yield good products, though the suggestions in the proceedings of last year, pp. 414 and 417, are worthy of consideration.

Liq. Ferri Per Sulphatis. and Ferri Oxidum Hydratum. — It is proposed to make a preparation officinal under the former of these names and to prepare the hydrated oxide from this by adding ammonia and washing. By this arrangement the latter preparation is rendered easy to prepare in the fresh condition necessary to furnish an efficient antidote to arsenious acid — while a liquid persalt of iron is at hand for making ammonia, ferric alum and other sesqui salts of iron. — For formula, see Parrish's Pharmacy, 2d edition, p. 512 to 514.

Ferri et Ammoniæ Sulphas. — Ammonia Iron Alum. This salt is deemed worthy to be made officinal. See formula, Parrish's Pharmacy, 2d edition, p. 513.

Ferri Lactas. — The extensive use of the protolactate of iron, its agreeable properties and the want of an authoritative formula for its preparation, all point to its introduction into the national standard. Wittstein's Pharmaceutical Chemistry furnishes two working formulas, though your Committee have had no experience with either.

Ferri Valerianas. — Wittstein gives a working formula, to which the Committee of Revision is referred, should they on mature deliberation adopt the preparation.

Ferri et Quiniæ Citras. — This preparation is very extensively prescribed, though made of varying proportions to suit the views and interests of manufacturers. It is questionable whether the wants of the profession require that it should be made officinal. Dr. Squibb has bestowed much attention to the details of its manufacture, and his article in the Am. Jour. Ph., vol. xxvii., p. 294, will furnish light upon it, if it should be determined to introduce it.

Ferri Phosphas. — The mixed and variable character of this salt furnishes an objection to its use, and the introduction of the pyro phosphate and the extensive preference given it in practice seem to point to its substitution.

HYDRARGYRUM.

We are not aware of any important changes or additions required among the preparations of mercury, but would suggest the revision of the tests appended to each, and that tests be appended to hydrargyrum cum creta.

INFUSA. AND DECOCTA.

These classes of preparations are mostly directed to be made by processes which furnish very inelegant results. If physicians would be satisfied, in the case of the infusions, to

substitute the process of displacement with cold water as practised in the case of Infusum cinchonæ flavæ, it would meet the approval of pharmaceutists generally.

Infusum Digitalis. — The addition of tincture of cinnamon should precede the straining of the infusion.

DECOCTA.

Decoctions should be boiled in a covered vessel for a definite length of time and then make up to the proper measure by the addition of water. The present processes are either indefinite or difficult to carry out accurately.

MAGNESIA.

In the directions for calcining magnesia, substitute a heat below redness, so as to secure a softer product.

Liquor Magnesiæ Citratis. — We propose to substitute the following:

Take of Citric Acid,	nine ounces.
Magnesia,	two ounces and five drachms.
Syrup of Citric Acid,	12 fluid ounces, or sufficient.
Water,	one gallon, or sufficient.

Make an acid solution of citrate of magnesia with citric acid, magnesia and three pints of the water; to this add the lemon syrup and divide the whole among twelve bottles each of twelve fluid ounces capacity; fill these with the remainder of the water, adjust the corks, and add to each bottle about forty grains of bicarbonate of potassa. The quantity of magnesia must be varied from the above, if the citrate formed is not decidedly acid to the taste; and if, after the solution is mixed with the syrup, it is deemed disagreeably acid or alkaline, the quantity of the bicarbonate of potassa may be varied accordingly.

OLEA DESTILLATA.

Add to this class:

Oleum Erigeronis. — From the several species of fleabane.

PILULÆ.

In the formula for *Pilulæ Catharticæ Compositæ* it is proposed to substitute extract of podophyllum for that of jalap; with a view to retain this preparation of the same degree of activity as heretofore, two drachms of the former extract might substitute the three drachms of the latter, though this would make the pill somewhat smaller.

Pilulæ Ferri Iodidi might be advantageously omitted, being a very imperfect preparation.

Pilulæ Hydrargyri Chloridi Mitis. — These pills are rarely prescribed in the officinal proportion, and should be omitted.

Pilulæ Opii. — We have long thought opium an unsuitable excipient, for a drug containing an alkaloid salt which is incompatible with alkalies.

Pilulæ Scillæ Compositæ are, we think, nearly obsolete.

Pilulæ Calomelanos Compositæ. — The well known Plummer's Pill is extensively prescribed in this country, increasingly so in the experience of your Committee, and we think it should be made officinal, adopting the new formula of the British Colleges, when ascertained.

POTASSA.

Potassa Cum Calce. — Should direct in addition to the powder a fused or stick caustic.

PULPÆ.

These preparations are never prepared, that we know of, for separate use, and we propose their being omitted from the new edition, substituting a different mode of preparation for confection of senna.

SODA.

The increasing use of *chlorate of soda* in place of *chlorate of potassa*, induced by its greater solubility and asserted milder action, raises the question whether it might not be placed among the preparations of the New Pharmacopœia; if so, what is the best and most practicable process for its preparation?

Valerianate of Soda is much used for the preparation of other valerianates, and should be introduced for that purpose.

SYRUPI.

Syrupus Aurantii Corticis. — This recipe should specify what kind of orange peel is designed. The fresh oranges of our markets yield a pleasantly flavored syrup, without bitterness, while the bitter orange peel of the shops furnishes a bitter and more medicinal syrup.

Syrupus Ipecacuanhæ. — The present officinal process by displacement yields a good preparation, if followed with care, but there is an almost universal preference among pharmaceutists for a less complicated formula, using a fluid extract and simple syrup. We find among physicians and pharmaceutists a general opinion in favor of increasing the proportion of the active ingredient in this syrup. Wine of ipecacuanha at present has double the strength of syrup, and we incline to an ounce and a half instead of an ounce in this recipe, and double that quantity in the case of the wine.

Syrupus Pruni Virginiana. — We think that with a fine powder instead of coarse, as specified in this formula, a stronger preparation would be practicable, and suggest six ounces instead of five of the bark to the quantities directed in the officinal formula.

Syrupus Scillæ Compositus. — No way occurs to us to improve this opprobrium of our art so free from objection as that suggested by Wm. Hodgson, Jr., to use acetic acid as the anticeptic ingredient.

Syrupus Sennæ. — There is no necessity for this preparation, since the general introduction of the fluid extract into use.

Syrupus Morphiæ Sulphatis. — The frequent prescriptions for a preparation under this name are at present variously dispensed by solutions of the salt in syrup, of the proportions, one grain to the fluid ounce, and one grain to four fluid ounces;

there is also a mixed syrup and mucilage, containing this last proportion of morphia salt, much dispensed under the name of Jackson's Pectoral Syrup. In revising the *Pharmacopœia* a good opportunity is allowed to authorize a diluted morphia syrup, and thus introduce something like uniformity into practice in this regard. We incline to the adoption of a compound syrup of morphia, with a formula similar to that of Prof. Jackson, published by A. B. Taylor, Am. Jour. Pharm., vol. xxiv., p. 34. This would also do to supersede syrup of poppies, which it much resembles.

TINCTURÆ.

To the tinctures already officinal we propose to add the following:

Tinctura Arnicæ. — Take of arnica in powder, eight ounces, alcohol, sufficient. To the arnica introduced into a suitable vessel add sufficient alcohol to moisten it, then pack thoroughly in a displacement funnel; cover the surface with a porous material, and pour on alcohol until two pints of tincture are obtained, care being taken that the percolate does not pass faster than drop by drop, and that the last portion of the liquid is nearly destitute of the color and taste of the arnica.

The use of strong alcohol seems to be indicated in the case of a tincture which is so extensively used as a stimulating liniment. It also has the advantage of extracting the essential oil more perfectly, and is less contaminated with extractive matters souble in water than diluted alcohol used by some.

Tinctura Cannabis Indicæ. — This preparation, as officinal in the Dublin Pharmacopœia, is so incompatible with aqueous liquids that we suggest to the Committee of Revision, should they determine upon making such a preparation officinal, to experiment with the different alkalies with a view to such an addition as would increase the solubility of Cannabin.

TROCHISCI.

An addition to this class is recommended, of *Trochisci Ferri Carbonatis.* For formula, see Parrish's Pharmacy, 2d edition, p. 250.

These lozenges are made by numerous pharmaceutists, and very extensively prescribed, affording a convenient method of dispensing one of the most useful of the salts of iron.

UNGUENTA.

Unguentum Aquæ Rosæ. — The officinal recipe makes too soft a preparation and lacking that elegance which is demanded in an ointment of the kind; we prefer that found in Parrish's Pharmacy, 2d edition, p. 643.

Unguentum Hydrargyri Nitratis. — The use of neat's-foot oil is considered by many pharmaceutists quite unnecessary in this preparation, and we would suggest the substitution of lard oil as a more agreeable and accessible vehicle for the mercurial salt.

VINA MEDICATA.

Vinum Rhei and Vinum Tabaci are almost obsolete.

ZINCUM.

Zinci Chloridi. — This should be fused after evaporation to dryness. The present formula omits this direction.

Zinci Valerianus. — This is, perhaps, the most used of the salts of valerianic acid. It should certainly be made officinal among the preparations, with a convenient formula.

Your Committee are well aware that these strictures upon the Pharmacopœia, and suggestions in regard to its revision, do not cover the whole ground, nor are they accompanied with those evidences of mature investigation that will commend them to more than a passing notice; but they have deemed the work allotted to them one of suggestion, and not of legislation. In their individual capacity they will have further participation in the labor of preliminary revision, and will be glad to

urge the views of the Association, as far as they can be ascertained, in the large Committees which will be engaged experimentally upon the processes of the Pharmacopœia.

Respectfully submitted,

EDWARD PARRISH,
ISRAEL J. GRAHAME,
CHARLES T. CARNEY.

APPENDIX A.

LIST OF ARTICLES it is proposed to transfer from the Secondary to the Primary List:

1. Arnica — Leopard's Bane. The flowers of Arnica Montana.
2. Asarum — Wild Ginger (Canada Snake Root). The root of Asarum Canadense.
3. Cataria — Catnip. The leaves of Nepeta Cataria.
4. Coptis — Goldthread. The root of Coptis Trifolia.
5. Extractum Cannabis — Extract of Hemp. An alcoholic extract of dried tops of Cannabis Sativa, Var. Indica.
6. Filix Mas — Malefern. The rhizome of Aspidium Filix Mas.
7. Heleanthemum — Frost Wort. The herb of Heleanthemum Canadense.
8. Oleum Cajuputi — Oil of Cajeput. The volatile oil of the leaves of Melaleuca Cajuputis.
9. Pareira — Pareira Brava. The root of Cissampelos Pareira.
10. Salvia — Sage. The leaves of Salvia Officinalis.
11. Sambucus — Elder Flowers. The flowers of Sambucus Canadensis.
12. Scoparius — Broom. The fresh tops of Cytisus Scoparius.
13. Macis — Mace. The anyllus of the fruit of Myristica Morchase.
14. Marrubium — Horehound. The herb of Marrubium Vulgare.
15. Matricaria — German Chamomile. The flowers of Matricaria Chamomilla.
16. Melissa — Balm. The herb of Melissa Officinalis.

PROPOSED NEW OFFICINALS.

Acidum Lacticum — Lactic Acid (description and tests.)
Acidum Phosphoricum — Glacial Phosphoric Acids (description and tests.)
Æther (description and tests.)
Alcohol Amylum — Fusel Oil (description and tests.)
Ammoniæ Carbonas.
Ammoniæ Sulphas.
Aqua Flores Aurantii.
Artemisia Contra (Levant Worm Seed,) or Sautonica Semen.

Belladonna Radix.

Caffea — Coffee.

Capsicum Baccatum — Birdpepper. (Change Capsicum, as at present, to Capsicum Annuum.

Chiretta — The herb and root of Agathotes Chirayta.

Chloroformum (description and tests.)

Gelseminum — Queen's Delight. Root of Gelseminum Sempervirens.

Glycerina — Glycerin. A peculiar sweet principle obtained from fats.

Gossypii Radix — Cotton Root. The root of Gossypium Herbaceum, and of other species of G.

Hydrastis Canadensis — Yellow Root. Golden Seal. The root of Hydrastis Canadensis.

Ignatia Amara — St. Ignatius Bean. The seeds of Strychnos St. Ignatiæ.

Leptandra — Culver's Physic. The root of Leptandra Virginica.

Lobelia Semen.

Lycopodium — A peculiar powder from Lycopodium Clavatum, and other species.

Oleum Adipis — Lard Oil. The fluid portion of lard, separated by expression.

Oleum Æthereum — Ethereal Oil. With description.

Oleum Camphoræ — Oil of Camphor. With description.

Oleum Succini — Oil of Amber (with description, from the preparations.)

Saccharum Lactis — Sugar of Milk. Lacten. The peculiar sugar obtained from milk.

Spiritus Lauri Foliæ — Bay Rum. The distilled spirit from bay leaves.

Vanilla — Vanilla Beans. The prepared unripe Capsules of Vanilla Aromatica.

Amygdala Persica — Peach Leaves. The leaves of Amygdalas Persica.

ADD TO SECONDARY LIST.

Achillea Millefolium — Millefoil. Yarrow.

Angelica Archangelica — Angelica Root.

Baptisia Tinctoria — Wild Indigo. The herb.

Berberis Vulgare — Barberry. The root.

Caulophyllum Calactroides. Blue Cohosh. The root.

Corydalis Formosa — Turkey Corn. The tubers.

Cucurbita Pepo — Pumpkin Seeds.

Cyprepedium Pubescens — Nerve Root.

Epigea Repens — Trailing Arbutus.

Euonymus Atropurpureus — Wahoo. Bark.

Eupatoreum Purpureum — Gravelroot. Ironweed.

Hydrangea Arborescens — Hydrangea Root.

Myrica Cereca — Bayberry Bark.

Rubus Ideæus — Raspberries. The fruit.

Rumex Crispus — Yellow Dock. The root.

APPENDIX B.

PERCOLATION.

This process, which is frequently directed throughout the Pharmacopœia, is a rapid and effectual method of extracting the soluble principles from drugs. It consists in subjecting a porous material, in powder, to the solvent action of successive portions of a liquid, called a menstruum. The necessary apparatus consists of a tube or funnel to contain the powder, and a vessel, either graduated, or of known capacity, to receive the liquid, which, as it passes from the tube, is called the percolate. Different substances, from their varying porosity and solubility, require that the process should be varied, and, accordingly, the directions are specific in each case, the fineness of the powders being indicated by the number of meshes to the linear inch in the sieves through which they are to be passed; the quantity of the menstruum to be added before packing in the apparatus, and the subsequent details of the process being also carefully indicated.

APPENDIX C.

[*Page* 60 of the Pharmacopœia.]

Acetum Colchici. — *Vinegar of Colchicum.*

Take of Colchicum Root, (recently dried), in powder, No. 50, 2 ounces.
Diluted Acetic Acid, . . . a sufficient quantity.

Dampen the powder, by rubbing uniformly through it half an ounce of the diluted acetic acid; pack with moderate firmness in a glass displacer; cover the surface with coarse cotton or linen cloth, or perforated porous paper; pour on acetic acid until two pints of liquid pass, then filter through paper, and keep it in a cool place.

Acetum Opii. — *Vinegar of Opium.* (Black Drop.)

Take of Opium, in powder, No. 50 . . . 4 ounces.
Nutmeg, in powder, No. 50 . . . 6 drachms.
Saffron, in powder, No. 50 . . . 2 drachms.
Sugar, in powder . . . . 5 ounces.
Diluted Acetic Acid, a sufficient quantity.

Mix intimately with the powders an equal bulk of saw dust passed through a No. 50 sieve, and digested in alcohol, and put the whole, *dry*, into a glass funnel displacer; arrange the powder level with *very little* pressure; cover the surface with perforated filtering paper, and pour on it diluted acetic acid. When ten fluid ounces of liquid shall have passed, put it aside; continue the percolation until the fluid which passes is nearly free from taste; evaporate this latter portion of liquid in a water bath to four fluid ounces, to which add two drachms of acetic acid, and mix with the ten fluid ounces first obtained; then heat the whole in a glass or porcelain vessel nearly to ebullition. When cold,

filter through paper, and to the filtered solution add the sugar, and agitate occasionally until dissolved. If the product should not measure seventeen fluid ounces, make it up to that quantity by the addition of diluted acetic acid.

Acidum Sulphuricum Aromaticum. — Aromatic Sulphuric Acid.

(Elixir of Vitriol.)

Take of	Sulphuric Acid	f ounces iiiss.
	Ginger, in powder, No. 50	ounce j.
	Cinnamon, in powder, No. 50	ounces iss.
	Alcohol	q. s.

Mix the acid gradually with two pints of alcohol, and allow the mixture to cool. Having mixed the ginger and cinnamon, dampen them with about f ounce ss. of the acid liquid, and pack them with moderate firmness in a glass funnel displacer; cover the surface with perforated filtering paper or other porous material, and pour on the remainder of the acid liquid. When it ceases to drop, pour on sufficient alcohol to displace the liquid retained by the dregs.

Ceratum Calamina. — Calamine Cerate. (Turner's Cerate.)

Take of	Prepared Calamine	ounces iij.
	Yellow Wax	ounces iiiss.
	Lard	ounces x ss.
	Olive Oil	f ounce j.
	Peruvian Balsam	f ounce ss.

Melt together the lard and wax, to which, removed from the fire, add the calamine, previously triturated with the olive oil until a perfectly smooth paste is produced; stir them well together, and when nearly cool, add the Peruvian balsam, and continue the stirring to completion.

Ceratum Plumbi Subacetatis. — Cerate of Subacetate of Lead.

(Goulard's Cerate.)

Take of	Lard	ounces viij.
	White Wax	ounces iv.
	Peruvian Balsam	drachms ij.
	Solution of Subacetate of Lead	f ounces iiss.
	Camphor	drachm ss.
	Olive Oil	f ounce ss.

Melt together the lard and wax, and stir them constantly until nearly cool; then add gradually the solution of subacetate of lead, and continue the stirring until cool. Lastly, add the camphor, dissolved in the oil and Peruvian balsam, and mix.

Ceratum Sabinæ. — Savin Cerate.

Take of	Savin, in powder, No. 50	two ounces.
	Alcohol	a sufficient quantity.
	Lard	seven ounces and a half.
	Resin	an ounce and a half.
	Yellow Wax	three ounces.

To the savin, suitably moistened with alcohol and packed tightly into a displacement funnel, add sufficient alcohol to recover six fluid ounces of percolate; evaporate this spontaneously, or by a temperature below its boiling point, to two fluid ounces. Melt together the lard, resin and wax, and stir them constantly till nearly cool; then add the concentrated tincture of savin, and continue the stirring to completion.

Ceratum Saponis. — Soap Cerate.

Take of	Lead Plaster	ounces vj.
	White Wax	ounces iij.
	Olive Oil	f ounces x.
	White Castile Soap, in fine powder	ounces iiss.
	Peruvian Balsam	ounces ss.

Melt together, at a moderate temperature, the lead plaster, white wax and one half the olive oil; then add the soap previously triturated with the remainder of the oil; stir them well together until nearly cool, and add lastly the Peruvian balsam, and mix.*

Confectio Rosæ. — Confection of Roses.

Take of	Red Roses, in powder, No. 50	ounces iv.
	Refined Sugar, in powder	ounces xxx.
	Clarified Honey	ounces iv.
	Diluted Alcohol	q. s.
	Oil of Roses	vi. m.

Dampen the powder of roses with a portion of the diluted alcohol, and pack with moderate firmness in a glass funnel displacer; cover the surface with perforated filtering paper, and pour on diluted alcohol; reserve the first one and half ounces of liquid which pass; continue the percolation until twelve fluid ounces more pass, or to exhaustion; reduce this by water bath at a temperature under 175° Fahr., to two fluid ounces, and having mixed this with the portion first obtained, add the oil of roses, and mix them. Triturate this with the sugar, add the honey, and beat the whole together until they are thoroughly mixed.

* See paper of I. J. Grahame, proceedings of 1858, p. 217.

Confectio Sennæ.— Confection of Senna. (Lenitive Electuary.)

Take of	Pulp of Purging Cassia, with seeds	ounces iv.
	Tamarinds	ounces viij.
	Prunes, without seeds	ounces iv.
	Senna, in powder, No. 50	ounces iv.
	Figs, sliced	ounces vj.
	Coriander, in powder, No. 60, recently prepared	ounces jj.
	Sugar	ounces xiv.
	Alcohol, Water, each	q. s.

Pour on the pulp of purging cassia, prunes and tamarinds, sufficient boiling water to thoroughly soften them; rub them through a hair sieve, to separate the pulp; if necessary treat the residue in the sieve in like manner, and mix with the previous portion; reserve the pulp thus made. Prepare a menstruum of one measure of alcohol, and three of water, of which pour f drachms ix. on the powdered senna, and rub uniformly through it, so as to dampen it; arrange the dampened powder in a glass funnel for displacement, using *very slight* pressure; pour on the menstruum, and reserve the first six fluid ounces which pass; continue the percolation until f ounces xviij. more pass; evaporate this over a water bath to a syrupy consistence; add the six fluid ounces first obtained, and continue the evaporation until reduced to f ounces iij., in which dissolve ounces iij. of the sugar, and mix with the prepared pulps. Boil the figs with two pints of water until reduced to f ounces xij.; then press out the liquor, strain and evaporate in a water bath to f ounces vj., to which add the remainder of the sugar, and make a syrup; stir into this the mixture of senna and pulps, and evaporate by means of a water bath to the proper consistence; lastly, throw in the powdered coriander, and mix them all well together.

Emplastrum Ammoniaci cum Hydrargyro. — Plaster of Ammoniac with Mercury.

Take of	Ammoniac	ounces viij.
	Mercury	ounces iv.
	Resin Plaster	ounces v.
	Glycerin	f. drachms iij.
	Water	q. s.

Having reduced the ammoniac to a coarse powder, triturate one-fourth of it with the glycerin and a little water, so as to form a smooth paste, add the mercury, and continue the trituration, adding a little water from time to time, as may be necessary, until globules are no longer visible. Triturate the remainder of the ammoniac, with sufficient water to form a smooth paste, the whole to be well mixed and transferred to a water bath; the resin plaster, previously melted, to be now added, and the mixture suffered to remain in the water-bath until all moisture is dissipated.

Emplastrum Opii. — Opium Plaster.

Take of	Opium, in powder, (No. 50)	ounces ij.
	Burgundy Pitch	ounces iij.
	Lead Plaster	ounces xij.
	Water	q. s.

Mix the powdered opium with an equal bulk of sawdust, of the same fineness; put the dry powder into a glass funnel, arranged for displacement; level it with very little pressure, and cover the surface with perforated filtering paper, then pour on water and displace to exhaustion; evaporate the liquor until reduced to a syrupy consistence, and, having previously melted together the burgundy pitch and lead plaster, mix this with the melted mass, and maintain in a water-bath until all moisture is dissipated.

Ext. Aconiti Alcoholicum. — Alcoholic Extract of Aconite.

Take of	Aconite leaves, recently dried, in powder, (No. 50)	ounces xij.
	Alcohol	ounces xviij.
	Diluted Alcohol	q. s.

Dampen the powdered leaves with the alcohol, and transfer to a suitable displacer; pack it with gentle pressure, and cover the surface with perforated filtering paper. Pour on the remainder of the alcohol, and when it ceases to drop, pour on diluted alcohol, and when f. ounces xviij., or the alcoholic portion, has passed, put it aside for spontaneous evaporation until reduced to f. ounces iij.; continue the percolation with diluted alcohol to exhaustion, evaporate this in a water-bath maintained at a temperature not exceeding 160° F., until reduced to a syrupy consistence; then reduce the temperature of the bath to 120° F., add the alcoholic solution and evaporate to the proper consistence.

Prepare in like manner with the above:

Alcoholic Extract of Belladonna
Alcoholic Extract of Conium
Alcoholic Extract of Hyoscyamus
Alcoholic Extract of Sarsaparilla.

Extractum Cinchonæ Flavæ. — Extract of Yellow Bark.

Take of	Yellow Bark, in powder, (No. 50)	ounces xij.
	Alcohol	four pints.
	Water, a sufficient quantity.	

Dampen the powdered bark with a portion of the alcohol, and pack it firmly in a suitable displacer; cover the surface with perforated paper, and pour on the remainder of the alcohol, when the liquid ceases to drop; pour on water until four pints of liquid or the alcoholic solution has passed, set it aside, and continue the percolation with water, until exhausted. Distil off the alcohol from the tincture, and evaporate the aqueous solution till the liquids respectively are brought to the consistence of thin honey; then mix them and evaporate so as to form an extract.

In the same manner prepare

Extractum Cinchonæ Rubræ.— Extract of Red Bark.

From red bark, in powder, (No. 50)

Extractum Jalap. — Extract of Jalap.

Take of Jalap, in powder, (No. 50) . . .	ounces xij.
Alcohol	oiiss.
Diluted alcohol (alcohol 2 parts, water 3)	q. s.

Dampen the powder with a portion of the alcohol, and pack it with moderate pressure in a suitable displacer, cover the surface with perforated filtering paper, and pour on the remainder of the alcohol, when the liquid ceases to drop; pour on the diluted alcohol, and when two and a half pints of liquid or the alcoholic solution has passed, put it aside. Continue the percolation with the diluted alcohol until three pints more of liquid pass. Evaporate the two liquids separately until reduced to a syrupy consistence; then mix them and evaporate so as to form an extract.

Prepare in like manner

Extractum Podophylli. — Extract of May Apple.

Extractum Opii. — Extract of Opium.

Take of Opium, in powder, (No. 50) . .	ounces xij.
Water, a sufficient quantity.	

Mix the opium intimately with an equal bulk of prepared sawdust, and arrange the dry powder in a suitable displacer, using slight pressure; cover the surface with perforated filtering paper, and pour on water until the displaced liquid has little taste of the opium. Evaporate the solution in a water bath to the proper consistence.

Extractum Rhei. — Extract of Rhubarb.

Take of Rhubarb, in powder, (No. 50) . .	ounces xij.
Alcohol	7 parts.
Water	1 part.

Mix the alcohol and water in the above proportions, and dampen the rhubarb with a small portion of the menstruum; transfer to a suitable displacer, and having compressed it moderately, cover the surface with perforated filtering paper, then pour on the menstruum, and when f. ounces xij. shall have passed, set aside for spontaneous evaporation until reduced one half. Continue the percolation until the liquid comes away nearly tasteless. Evaporate this portion of liquid in a porcelain dish, by means of a water bath, at a temperature not exceeding 160° F., until reduced to nearly a syrupy consistence, add the first portion and continue the evaporation at the same temperature until reduced to the proper consistence. Avoid in its preparation the use of an iron spatula.

Extractum Taraxaci. — Extract of Dandelion.

Take of Taraxacum root, gathered in September, and recently dried, in powder, (No. 50). . } ounces xvj.
Diluted Alcohol (alcohol 5 parts, water 3) . q. s.

Dampen the powder with the diluted alcohol, transfer to a suitable displacer, and having compressed it moderately, cover the surface with perforated filtering paper, then pour on the diluted alcohol; reserve the first pint of liquid which passes, and continue the percolation to exhaustion. Evaporate the last obtained liquid to a thin syrupy consistence, then add the reserved solution, and continue the evaporation until reduced to the proper consistence.

Ext. Tarax. Fluida. — Fluid Extract of Taraxacum.

Take of Taraxacum Root, gathered in September, and recently dried, in powder, (No. 50) } ounces xvj.
Diluted Alcohol (alcohol 5 parts, water 3 parts) q. s
Sac. Alb. . . . . ounces vij.

Dampen the powder with four fluid ounces of the diluted alcohol, and transfer to a glass displacer; compress it moderately and cover the surface with perforated porous paper, then pour on the diluted alcohol and percolate to exhaustion, reserving six fluid drachms from the first half pint of liquid. Filter the tincture and evaporate it in a water bath at a temperature of 160° F., until reduced to twelve fluid ounces, to which add the sugar, and when dissolved strain. Finally, add the reserved tincture. The product should measure sixteen fluid ounces.

REPORT ON HOME ADULTERATIONS.

The Committee upon the subject of Home Adulterations, appointed at the annual meeting of this Association, held in Washington last year, respectfully report:

That the subject placed in their hands has received, as it deserves, careful consideration.

The coöperation of our pharmaceutical brethren from all parts of our country has been solicited, and your Committee take pleasure in stating that the interest shown by our members in this subject proves that it is a matter worthy of all the time and care bestowed upon it, from year to year, by the Association.

The matter of adulteration is one that appeals to every person strongly. Viewed in the best light we can place it, that of a mere matter of dollars and cents, it even then meets with the condemnation of those who are only conscious of the wickedness of the practice by being touched in their most sensitive region — the pocket.

For although some do say that mixing rice flour with cream of tartar, and chicory with coffee, is a "*harmless*" sophistication, still, when they are obliged to pay the price of "Best Old Mocha," for chicory, and forty cents a pound for rice flour, *then* the enormity of the offence is at once apparent.

Before presenting to the Association such specimens of adulterations and sophistications as your Committee have to offer, it will be well, perhaps, to give an explanation as to what constitutes an adulteration. For the best definition of an adulteration we are indebted to Dr. Hassall, of London. He says: The sale of one article in place of another is not an adulteration, but a substitution. The presence of substances in articles, in consequence of impurities contained in the materials out of which they were prepared, as, for example, arsenic in the hydrochloric acid used in the preparation of unfermented bread, does not constitute *adulteration;* they are simply impurities. Lastly, the *accidental* presence of substances in any commodity does not constitute an adulteration. Excluding, then, from the class of adulterations all cases of substitution, impurities, and accidental contaminations, adulteration may be thus defined: It consists in the intentional addition to an article, for the purpose of gain, or deception, of any substance or substances, the presence of which is not acknowledged in the name under which the article is sold.

Your Committee feel that perhaps they may bring forward some facts, not in all cases agreeable, and that they may be met with the oft repeated statement that "the public wish the adulterated articles," that "pure mustard and cream of tartar will not sell," coffee with burnt peas and apples in it is "rich-

er," and more "nutritious," but we feel constrained to say this pretended regard for the wishes and tastes of the "public" is most generally based upon a slight interest for the pecuniary welfare of the manufacturer or trader.

The public do *not* wish adulterated articles; were they once aware of the real difference between pure and the impure articles they would not hesitate a moment in their choice: could they but see the peas and beans roasted for best "old Mocha," the sulphate of soda for "cream tartar" the turmeric for "mustard," the alum for "bread," and the sulphuric acid for "vinegar," your Committee feel that very soon the lucrative portion of the adulterator's business would pass away, leaving him with a reputation far from enviable.

It is not only in articles of food, but in medicines also, that this practice prevails, and your Committee have felt that upon this part of the subject they should bestow a large portion of their investigations.

Science is never so noble as when engaged in advancing those arts which promote health or mitigate the sufferings of humanity; but when it is prostituted to ignoble purposes, and, in direct opposition to the relieving of suffering, is engaged in sophisticating with a cunning and well concealed hand those very articles which the physician relies upon for promoting and restoring health, then indeed it is deserving of condemnation.

Very many of the adulterations of the present day exhibit a knowledge of science worthy a better cause; many of them are decidedly pernicious, and serious results have followed their use; of such we may instance the employment of poisonous pigments for the colored confections, lead in snuff and in Cayenne pepper, copper in pickles, and cocculus indicus and nux vomica in beer and ale.

Your Committee would refer to any of the works published in France or England, devoted to the exposure of the frauds in food and medicine, for evidence, were it needed, of the great

interest felt in this subject by scientific men; and they cannot better illustrate the necessity of these investigations than by giving a short list of those articles of food which have been proved to be adulterated and the substances used for the purpose. Many of these have been met with by your Committee, and some of them are described by Doctor Hassall in his work, on "The Adulterations of Food and Medicine."

The articles we specially refer to are as follows:

Colored Confectionery — Adulterated with emerald or Scheele's green, arsenite of copper.

Beer — with cocculus indicus and nux vomica.

Pickles and Bottled Fruits—with verdigris and sulphate of copper.

Custard Powders — with chromate of lead.

Tea and Snuff — with the same.

Cayenne and Curry Powder — with red oxide of lead.

Sugar Confectionery — with gamboge, orpiment, or sulphuret of arsenic, and chloride of copper.

Flour and Bread — with hydrated sulphate of lime, plaster of Paris, and alum.

Vinegar — with sulphuric acid.

Sugar — with sand and plaster of Paris.

Milk — with chalk, sheeps' brains, ground turmeric.

Arrow Root — with ground rice.

Chocolate — with rice flour, potato starch, gum tragacanth, cinnibar, bals. peru, red ox. mercury, red lead, carb. of lime, and the red ochres to bring up the color.

Mustard — with ground turmeric, to give it a brilliant color.

Butter — with potato starch, mutton tallow, carbonate of lead, and sugar of lead.

That it would be right to make public the persons who are directly engaged in the practice of adulteration, we feel that few would deny; but your Committee refrain from pursuing this course at present, suggesting, however, to the Association, the propriety of taking some measures for exposing those who make it a regular matter of business.

It is, perhaps, our *duty* to be more explicit in this matter as to what parties are guilty of the adulterations, but your Committee know that all classes of trade,—manufacturer, jobber, and retailer,— are sometimes implicated in these frauds.

Certain kinds of adulterations and sophistications are practised upon so large a scale as to be beyond the small dealer; they involve the use of extensive machinery which the ordinary tradesman does not possess.

It was once the practice for the druggists to systematically add to all drugs certain amounts of saw-dust, oatmeal, and other substances of less value than the article in its purity, to make good the loss by drying and powdering. The average loss was considered to be about four per cent., and as this amount was added to compensate, it was known as the "four per cent. system." The practice under this name was principally confined to England, but from specimens with which your Committee have, from time to time, met, it is apparent that a practice somewhat similar exists, occasionally, on this side the water.

Your Committee feel also that the tradesman is sometimes a party to the fraud, although he may not be the actual mixer. He often purchases of the wholesale dealer an article which he knows cannot be pure, from the price asked; he is willing, however, to stretch his elastic conscience round the apparent discrepancy, and, as one of the members of your Committee has been told by a retail apothecary, if the jobber told him an article *was* pure, although *he* knew it was not, he should consider the jobber as having taken the responsibility, and should buy and sell the article with a clear conscience.

Your Committee do not appreciate this kind of a conscience, and trust our profession is not graced with many such. It is our duty as pharmaceutists to do all in our power to put an end to this pernicious system of adulteration, using our influence against a practice which, in the language of another, "is undermining the very foundation of trade, namely, *faith in commercial integrity.*"

In England the matter of pecuniary loss to the government has been taken into consideration, and from careful estimates the revenue suffers by adulteration to the extent of two millions annually! The author of "Food of London" states that half the national revenue is derived from articles of consumption. "If the government loses so much, the public suffers a much greater loss."

This subject of home adulteration, then, is one worthy of attention by state and public officers, even as a question of pecuniary moment only.

As a matter relating to public health, this subject is worthy careful attention; very many of the adulterations practised upon food and medicine are said to be "harmless in themselves;" but we have seen that in a pecuniary point of view at least they are not so. Very many instances are on record, however, where not only serious but fatal results to health have followed the use of adulterated articles.

During the past year your Committee have met with very many instances of fraud and deception in drugs; some of these are very curious, and are worthy of a place in a report of this kind.

During the past year, in a wood-turner's shop in Boston, was seen more than a barrel of East India rhubarb, which was being turned down into "true Turkey."

This rhubarb was sold for genuine and real Turkey rhubarb.

A druggist was applied to by a man for a situation as porter in his store:

"What can you do? What have you been doing at your last place," were the questions asked.

"Oh," replied the man, "I have done every thing about the store that was needed, until the past year. I have worked up stairs in the *room* making Turkey rhubarb."

"Making Turkey rhubarb! what do you mean by that?"

"Why," replied the man, "we used to take the East India and *file* it and *bore* it into true Turkey."

The man was not engaged.

Both of these, it may be remarked, are merely instances grateful to those who urge that "*most* of the adulterations are *harmless*," but they must appeal with considerable force to those who are sensitive as to the mere value of an article in dollars and cents, for East India rhubarb at 90c. per lb., transformed into "true Turkey" at $4 50 per lb., is certainly a touching instance of the mutability of earthly things,— especially drugs.

There is one more aspect in which this subject of adulterations is to be considered, and that is the moral bearings of the practice. It is not possible for an adulterator to be a strictly honest man. The practice not only makes those guilty of it dishonest, but it also causes distrust on the part of those who buy; confidence in the integrity of the seller is lost by those who purchase, and not only do the guilty, but the honest traders suffer: in fact, the standard of morality and business integrity is lowered, and the innocent suffer with the guilty.

The truly upright man who cannot conscientiously adopt the practice of his competitors, how fares it with him?

He struggles alone, selling pure articles at a smaller profit than those who are less scrupulous; he is discouraged, and well he may be oftentimes; and were it not for the proud consciousness of right doing, he would become disheartened, less honest, and finally adopt the practices he formerly condemned.

The practice of adulteration, then, is one deserving condemnation, because prejudicial to public health, honesty, and morality, and, in a pecuniary view, as occasioning a loss to the public and the government.

If we admit the truth of the statement of Dr. Normandy, and very few will question it, we can see to how great an extent the practice has advanced. He says: "Adulteration is a wide-spread evil, which has invaded every branch of commerce. *Everything* which can be mixed or adulterated, or debased in any way, is debased."

Your Committee submit herewith a brief list of drugs found to be adulterated, and the articles used for the purpose.

Many of the substances referred to in this list are taken from "Chevalier's Dictionary of Alterations and Falsifications."

Acetate of morphia, is adulterated with acetate and phosphate of lime.

Benzoic acid, with asbestos, carbonate and sulphate of lime, hippuric acid and sugar.

Citric acid, with oxalic and tartaric acids, and sulphate of lime. It often contains sulphuric acid and salts of lead or copper. In 1850, M. Pennes discovered the presence of lead in this acid, obtained of three highly respectable dealers. The acid was very white, and was intended to prepare the purgative lemonade.

Tartaric acid, with cream of tartar, acid sulphate of potassa and with lime.

Aloes, with colophony, ochre, extract of licorice, gum arabic, and calcined bones.

Starch, with carbonate and sulphate of lime or alabaster; the more common fraud is, however, to saturate it with moisture.

Arrow root, with potato starch, and rice flour.

Assafœtida, with gum retins of poorer quality, with sand, and other hard substances.

Balsam Copaiva, with the resinous extract by decoction of the bark and branches of copaiba trees, turpentine, colophony, and fat oils.

Balsam Peru, with colophony, turpentine, benzoin resin, alcohol, and fixed oils.

Balsam Tolu, with turpentine, colophony, and other resins.

Chloroform, with chlorhydric ether, hypochlorous acid, hydro-carbonated oils, compounds of methyle and aldehyde, and fixed substances.

Beeswax, with resin, burgundy pitch, earthy matter, flowers of sulphur, starch and amylaceous substances, tallow, stearic acid, yellow ochre, calcined bones, and sawdust.

Tart. emetic, with cream tartar, oxide of antimony, tartrate of iron, chlor-calcium and potassium, and sometimes is contaminated with salts of copper and tin.

Essential oils, with alcohol and fixed oils.

Iodide potassium, with chloride potassium and soldium, and calcium, carbonate of potassa, and *bromide* of potassium. The latter salt being sometimes in so large a proportion, owing to its lesser price, as to *replace*, almost entirely, the iodide.

Manna, with glucose, or starch sugar and starch. The large flake manna is sometimes made from a mixture, consisting of a little manna, flour, honey, and a purgative powder; these are boiled together to a syrupy consistence, and then moulded in form of "flakes;" common "sorts manna" has been converted into "flake" by being boiled in water, clarified with charcoal, and moulded into proper form.

It is possible to extend this list, but your Committee feel that enough has been already brought forward to establish the fact, were proof necessary, that very many articles depended upon as medicines to restore health, may be, *because adulterated*, highly pernicious and even fatal in their effects.

Your Committee propose to offer, in concluding this report, already perhaps extended beyond its limits, a few specimens of adulterations and substitutions which have come to their knowledge the past year, and to give the simpler tests by which they may be detected.

First we ask your attention to the

SUBSTITUTIONS.

Specimen No. 1 is Western Alcohol. A barrel of this was sold for "Atwood's Alcohol." A very simple examination proves it to be loaded with grain oils, and thus exposes the fraud at once. The simplest way to detect the grain oils, is to treat the suspected sample with an equal volume of concentrated sulphuric acid; if grain oils are present, the mixture becomes darker colored, owing to their carbonization. Also they may be detected by solution of nitrate of silver; expose

the alcohol, to which this solution has been added, to the action of sunlight, or diffuse daylight — if grain oils are present, a black precipitate subsides after some little time. This change does not occur if the alcohol is pure.

Specimen No. 2 is an Oil, principally Linseed, which was sold for true "English oil of sweet almonds." The physical characteristics and the temperature required for congelation, serve to detect this fraud. Linseed oil remains fluid at zero, while true oil almonds congeals above that temperature.

Specimen No. 3 is false Oil of Bitter Almonds. This was purchased with the label of a well known English house upon it, and was sold as "true essential Oil of Bitter Almonds." It is the article known as "Essence de Mirban," or Nitro-Benzole, and may be detected very easily.

When a mixture of 1 volume *true* essential oil almonds, 2 volumes of alcohol, and 1 volume of very weak solution of potassa, mixed well together, is allowed to stand, it is converted into benzoic acid in from 24 to 48 hours.

The fictitious oil (nitro benzole) is not capable of undergoing this change.

Specimen No. 4 is fictitious Tapioca. This article purports to be the fecula of Jatropha manihot, or cassava. It is not, however, what it appears, and is proved to be, by microscopical examination, entirely a fictitious article, made from potato starch, and does not contain one particle of real Tapioca. This article is made in Liverpool, England, and imported into New York.

Your Committee cannot refrain from recommending the use of the microscope as being a very valuable aid to the pharmaceutist. By this instrument he is enabled to detect at once, frauds which perhaps might be previously unsuspected, particularly in articles of food, as in the instance just brought to your notice.

Specimen No. 5 is Melambo or Matias Bark. — This bark is largely used for grinding with all kinds of spices. For a

further description, we refer to Prof. Procter's Journal of Pharmacy, vol. 29th, pp. 103 and 215, where the nature and characteristics of this bark are very fully set forth by Messrs. Edward Parrish and Frank B. Dancy. Your Committee are not aware of *other* uses, to any extent, to which this bark is put, *except for adulterating spices.*

The next articles to be considered are

ADULTERATIONS.

Specimen No. 1. — This is an adulterated article of cubebs with the false berry used for the purpose. These cubebs were purchased as a select and superior article; the fraud existing in them was not discovered for some time. The false berry is readily distinguished, however, as it is bi-lobed, while the cubeb is a single lobed berry. There exists in the lot of cubebs from which these were taken 15 per cent. of false berries *by weight;* they are heavier than the cubebs, and are, on that account, easily added in sufficient amount to vitiate the quality of the drug without attracting notice. — Your Committee have endeavored without success to ascertain the name of this false berry; it appears to be inert and worthless, not possessed of any deleterious property other than that of reducing the strength of the powdered cubebs, which, in the amount present in sample under consideration, it does quite perceptibly.

Specimen No. 2 is French Lycopodium, which is adulterated with the starch of some species of lentil, apparently. The microscope reveals this adulteration at once, which otherwise might not be suspected. If treated with water and solution of iodine, the presence of starch may also be detected. This drug is often adulterated with starch, pulv. gypsum, and even box-wood powder. By separating with water the heavier adulterations, they can be examined and recognized, the wood powder can be separated by means of a sieve.

The specimen under examination is part of a lot purchased

in one pound bottles, with a French stamp and label upon it. A portion of it having accidentally been wet, the starch became "musty," revealing its presence, otherwise unsuspected. Subsequent examination, as above, furnished further proofs of its existence.

Specimen No. 3 is Para Balsam Copaiva. — This contains from 6 to 8 per cent. of heavy or fat oil.

Balsam Copaiva is very largely adulterated. It often contains the resinous extract by decoction of the branches and bark of the Copaifera, turpentine, colophony and fat oils, particularly castor oil. The balsam adulterated with turpentine is not of so heavy consistence as the true balsam; it is more viscid and sticks upon the sides of the bottles holding it. It may be easily proved whether turpentine is present or not, by simply heating a drop of the suspected balsam upon a sheet of glazed paper over a spirit lamp; the oil of copaiva is first volatized, and odor of the turpentine is at once apparent.

Castor oil is the most dangerous adulterative, owing to the great similiarity between that and true balsam. This may be detected by mixing three parts of the suspected balsam with one part sulphuric acid, and shaking with 15 or 20 parts of alcohol of 36 deg. If the mixture separates, it indicates that the balsam is adulterated with castor oil: when pure, there is no separation. This test will detect not less than 1-9th part of adulteration.

The presence of castor oil may also be detected by adding 2 parts ammonia 22 deg. Beaume, to 5 parts suspected balsam, and shaking them together in a stopped bottle. The mixture becomes viscid and "ropy," but very soon clears itself and becomes transparent, if pure.

It is whitened by agitation, on the contrary, if it contains castor oil. The only precaution to be taken, however, is that the temperature of the mixture should be from 50 to 60 deg. Fah.; above or below this point the result is inaccurate, as, from 68 to 76 deg. Fah. the mixture is transparent whether

pure or adulterated, and at 32 to 40 deg. Fah. the *pure* Balsam remains clouded.

The Fixed Oils may be discovered by heating a drop or two of the balsam upon paper. If the balsam is pure, the volatile oil is driven off, leaving the resin homogeneous, transparent, and brittle; if it contains heavy or fixed oil, the resin is surrounded by a greasy aureole and is less brittle.

Finally, Balsam Copaiva is "made up" of the fat oils, as poppy and rape seed, and turpentine. These mixtures, however, would deceive only the inexperienced; in all cases ethereal alcohol (4 parts alcohol, 1 part ether) serves to recognize this fraud, this liquid dissolving only the true balsam, leaving the foreign matters.

Specimen No. 4 is Powdered Opium. This is a very poor specimen of powdered opium. It was sold at a high price to a person not perfectly familiar with drugs, but to him it appeared so different from his idea of the article, that he requested an examination of it. It is found to contain less than three per cent. of impure morphia, which is but one-third or one-fourth the amount considered to be the standard yield by the United States Dispensary. It is evident that this powder of opium could scarcely fail to disappoint the expectations of the physician. What article is used for adulterating this, your Committee have not decided. It is possible that the opium was exhausted in part, before drying and powdering.

Specimen No. 5 is Balsam of Tolu containing 16 per cent. common resin. Balsam of tolu is often adulterated with turpentine and various resins. It is easy to detect this fraud by the peculiar resinous odor which the adulterated article gives off when burnt. It may also be distinguished by testing with sulphuric acid. The concentrated acid added to the pure balsam gives a cherry red liquor without disengagement of sulphurous acid; the same acid added to balsam adulterated with resin, gives a blackish brown liquor with abundant disengagement of sulphurous acid.

Specimen No. 6 is Powdered Tartar Emetic. This is largely contaminated with foreign bodies, containing as much as 21 per cent. of impurity. The impurity in it is doubtless owing to careless manufacturing; and as this article in powder is often made without proper and sufficient care being used in its manufacture, it is best for the pharmaceutist to buy none but the crystals, and being assured of their purity, powder them himself.

The impurities most generally present in tartar emetic are uncombined cream of tartar, chloride of calcium, or potassium, and sulphate of potassa. It also sometimes contains, as accidental contaminations, iron and tin. The uncombined cream of tartar may be detected by an acid solution of acetate of lead; the solution is made of 32 parts distilled water, 8 parts cryst. acetate of lead, and 15 parts acetic acid of 9 deg. The presence of cream of tartar is shown by the white precipitate produced in a solution of tartar emetic on adding a small portion of the lead reagent.

Chlorides of potassium or sodium, or chlorhydric acid, may be detected by their affording a white "curdy" precipitate, upon adding to a solution of tartar emetic a few drops solution nitrate of silver. This white precipitate, if *chloride of silver*, should be entirely soluble in ammonia.

This specimen under examination contains 8 per cent. of chlorides.

Sulphate of potassa may be detected by the white precipitate, insoluble in nitric acid, which is afforded by solution of chloride of barium, or nitrate of baryta.

The specimen under examination contains 13 per cent. of sulphates.

Specimen No. 7 is Cream of Tartar. This article is one used largely both as a medicine, and in the preparation of food; it is worthy of careful consideration, and your Committee have given considerable attention to it.

Cream of tartar is very largely adulterated. Some of the

articles used for the purpose are in one sense harmless; that is, not injurious to health; but many of them are decidedly pernicious, and *all* of them are to be condemned, because sold to deceive the community, and enrich the adulterator.

Cream of tartar is adulterated with tartrate of lime, chalk, finely powdered white marble, sulphate of lime, sand, nitrate of potassa, alum, sulphate of soda and potassa, chloride of potassium. It has been found to contain, as impurities, iron, copper, lead, and arsenic.

The addition of starch, arrow-root, and other amylaceous substances, is well known; and the specimen under examination is only remarkable from the fact that it contains 63.33 per cent. of farinaceous substances as adulteration.

This was sold as *pure* cream of tartar. The easiest way to detect the adulteration with starch of farinaceous substances, is by testing a cold solution of the cream of tartar with solution of iodine. The characteristic blue "iodide of starch" will at once be apparent.

If we treat the cream of tartar with boiling water, we dissolve all soluble substances, leaving behind the tartrate of lime, quartz, clay, sand, sulphate of lime, and other insoluble impurities.

Chalk or white marble may be discovered by the effervescence produced by the addition of a weak acid, as chlorhydric or nitric.

Alum and sulphates of potassa or soda are shown to be present by the white precipitate, insoluble in nitric acid, produced by solution of chloride of barium. If a precipitate is produced in the same solution by oxalate of ammonia, we know that lime is also present. Chloride of potassium is shown by the white "curdy" precipitate, entirely soluble in ammonia, formed by adding solution of nitrate of silver to the cream of tartar solution.

The iron, lead, and copper come from the vessels of these metals, in which the cream of tartar is purified.

The solution of cream of tartar, tested with tincture of galls, takes a *black* color if iron is present; with ammonia, a *blue* color if copper is present; with iodide potassium, a *yellow* if lead is present.

The presence of arsenic in cream of tartar, according to Dr. Bley, comes from the arsenical sulphur used in the "mutage," or process for arresting fermentation in the "must" of grapes, which consists of burning sulphur in the casks, thereby liberating sulphurous acid. The arsenic may be detected by Marsh's apparatus.

Specimen No. 8 is Acid Sulphate of Soda. This is the residue from nitric acid manufacturing. The nitrate of soda, or Chili saltpetre is decomposed by sulphuric acid, and this article remains. It is largely used to adulterate cream of tartar; and this

Specimen No. 9 is one which contains this adulteration. This acid sulphate may be considered one of the injurious adulterations.

There is one drawback to its use, however, as a substitute for cream of tartar, and that is its deliquescence, or property of taking moisture from the atmosphere. It was once attempted to substitute it for cream of tartar in a "Yeast Powder," but after having been put up, the article was obliged to be withdrawn from the market, because it destroyed the cans. Query — Will the human stomach bear it better than a tin can?

Specimen No. 10 is the "great adulterator." This article, known by the above name, is selenite or sulphate of lime. It is imported into New York, and there powdered for use.

Specimen No. 11 is the "great adulterator" in its natural state, before being powdered.

Specimen No. 12 is cream of tartar, which is adulterated with the "great adulterator." As this substance is almost insoluble, any one can judge of the benefit to health that might arise from a long-continued use of the article in the daily food.

The specimen of cream of tartar under examination contains 25 per cent. of the "great adulterator."

Specimen No. 13 is a fatty residue from oil of lemon. This was obtained from a sample of oil of lemon of suspected purity, the last winter, and amounted to 22 per cent. of the whole weight of oil. In cold weather it has a butyraceous consistence, but as it now appears is more fluid.

It is somewhat unusual to find an article of oil of lemon adulterated in this way; and your Committee would call the attention of pharmaceutists to this fact, as being evidence of a new practice in the way of fraud in this article.

Specimen No. 14 is Capsicum, with adulteration of common salt. This can be detected by exhausting the pepper with water, evaporating to dryness and testing the residue by nitrate of silver for chlorine; the soda imparts its characteristic color of yellow to flame of burning alcohol.

Corrosive Sublimate sent from Kentucky was proved to be adulterated with chloride of sodium (common salt) by the usual tests. The sample was too small to estimate the amount of impurity present, and we cannot show a specimen of it, because it was all consumed in examination.

Specimen No. 15. Lunar Caustic. This was sent from Kentucky also, having been purchased in New York, at a cost of $1.20 per oz., as a *pure* article. A great imposition was practised, either by the seller or the manufacturer. Upon a careful examination it yielded only 14 per cent. of chloride of silver, equivalent to about 10 per cent. of metallic silver. Had it been pure nitrate it should have yielded 64 per cent. of metallic silver.

Specimen No. 16. Piperine. Adulterated with yellow prussiate of potassa. This fraud can be easily detected by testing a solution of the suspected piperine with a per-salt of iron. The blue reaction is instantly produced, caused by formation of ferro-cyanide of iron.

This reaction taking place while combining a recipe in which

the Piperine and a salt of iron was ordered, led to the detection of the fraud, otherwise unsuspected.

Flowers or Oxide of Zinc. All specimens examined, except some German proved to be merely the carbonate.

Specimen No. 17. Oil of Bergamot. A lot of oil of bergamot, purchased at the market rates, and to all appearance a very fine article, proved to contain 30 per cent. of alcohol, by the usual test of the graduated tube and treatment with water.

Specimen No. 18. Oil of Wormwood. As regards smell and taste, this oil is unexceptionable. Its specific gravity is so low as to excite suspicion, and it proves to be adulterated with ether upon a careful examination.

This fraud can be easily detected by the low boiling point and specific gravity.

One of the members of your Committee, who is acquainted with a gentleman formerly in the drug grinding business in New York, has been kindly furnished by him with some formulas by which "pure and genuine drugs" were prepared when he was employed at the mill referred to:

Powdered Cape Aloes — Cape aloes dried, 100 lbs.; ship biscuit, 100 lbs.; curcuma q. s. to color.

Common Ginger — African ginger, 200 lbs.; capsicum hulls, 25 lbs.; biscuit, 100 lbs.; curcuma q. s. to color.

Ipecac powdered — Ipecac, 100 lbs.; ship biscuit, 25 to 40 lbs.

Opium, powdered — Turkey opium, 50 lbs.; Egyptian opium, 25 lbs.; biscuit, 40 lbs.

Gamboge, powdered — Gamboge, 100 lbs.; tartrate of lime, 25 lbs.

Socotrine Aloes are pure Bonaire, without adulteration.

Cream of Tartar is adulterated with from 10 to 65 per cent. of terra alba, or tartrate of lime, with about 3 per cent. tartaric acid.

Tartaric Acid, powdered — Tartaric acid 1000 lbs.; alum, from 10 to 35 per cent.

Scammony Aleppo, powdered — Virgin Scammony, 30 lbs.; cocoa beans, 80 lbs.; biscuit 30 lbs.; lampblack, q. s. (sufficient quantity) to color.

Bird Pepper, powdered — Chilies, 1000 lbs.; rice, 800 to 1200 lbs.; curcuma and Venetian red to color.

Powdered Fenugreek — Fenugreek seeds, 1000 lbs.; biscuit, 1000 lbs.; curcuma q. s. to color.

East India Rhubarb, powdered — East India rhubarb, 100 lbs.; English do., 60 lbs.

English Rhubarb, powdered — English rhubarb, 100 lbs.; biscuit, 30 lbs.; curcuma to color.

Turkey Rhubarb, powdered — East India rhubarb, Turkey rhubarb, equal parts.

The tartrate of lime referred to is more properly sulphate of lime with a small portion of tartrate. The ship biscuit is the hard and often worm-eaten cakes brought in by ships after a long voyage.

Your Committee have noticed, in making a number of examinations of articles furnished by manufacturers, as acetic, nitric, muriatic acids, aqua ammonia, oxide of zinc, sub-carbonate of iron, and others, that but little attention is paid to the requirements of the Pharmacopœia, as every pharmaceutist can ascertain with but little trouble.

We think it important, and would suggest to this Association the propriety of calling special attention to this point; that while we *have* a standard, our manufacturers should furnish articles that can be depended upon for purity and for officinal strength.

In conclusion, your Committee express the hope that the effort made by them to awaken more of an interest in the subject of adulterations, may meet with favorable support from this Association.

We feel that we have barely touched upon the subject; very many instances of fraud and deception are not alluded to; but what we have said and done we trust may be for the benefit

of the public and of our profession at large. We cannot take leave of the subject, however, without expressing the satisfaction we feel as we refer to very many members of our profession who strive to raise the standard of their business by discountenancing in every way in their power all fraud and deception.

The stigma of adulteration does not belong to the drug trade alone; in fact, very many articles of food are systematically and almost always adulterated, so that to obtain them in their absolute purity is almost the exception. Of such are the ground spices, coffees, &c.

We are aware this is a strong assertion, but proof can be produced were it necessary.

Of one article referred to, that of ground coffee, we can give the formula by which it is made.

This coffee put up in 1 lb. papers, and labelled "fine old Java," is made as follows: for every 100 pounds there are 60 pounds of peas, 20 pounds of chicory, and 20 pounds of coffee.

This compound sells for 12½ cents per pound, and any person can judge of the value of it as coffee, containing as it does but 20 per cent. of that substance.

There are many upright and honorable men, however, who discountenance any such imposition upon the public, in all branches of trade, and we feel a proud satisfaction in referring to them, whether members of our profession or not; in *our own ranks* we know there are many on whom the public can rely, and in closing we can only urge upon this Association, once more, the importance of this subject, earnestly soliciting the hearty coöperation of every member to raise the standard of our profession, and as far as possible to discourage and expose fraud and deception.

CHARLES T. CARNEY, A. P. SHARP,
EDWARD R. SQUIBB, A. B. TAYLOR,
On behalf of the Committee.

SPECIAL REPORTS

ON SUBJECTS ALLOTTED FOR INVESTIGATION AT THE MEETING IN WASHINGTON, 1858.

FORMULÆ FOR THE FLUID EXTRACTS IN REFERENCE TO THEIR MORE GENERAL ADOPTION IN THE NEXT PHARMACOPŒIA.

BY WILLIAM PROCTER, JR.

Having accepted at the annual meeting of the Association for 1858 the subject of Improved Formulæ for the Fluid Extracts, I have occupied no inconsiderable portion of time in carrying on the investigations required in giving a rational solution to the questions involved.

After some reflection it was determined to consider in groups the several drugs appropriate for fluid extracts, the generic character of which was to be derived from an analogy of composition or of behavior with solvents, by which the same process could be employed for each member of a group; leaving all those drugs which possessed some peculiarity of constitution, rendering it necessary, to be treated by special process.

In the formulæ adopted, it has not been designed to retain in solution all the matter dissolved by the menstruum from each drug, as suggested by some; nor to reject all not usefully medicinal as sought by others; but to extract as far as possible all the valuable ingredients, and to condense them into the required bulk, of an ounce to the fluid ounce, except in the oleoresins, in the way least calculated to injure their medicinal virtues and sensible qualities, leaving the resulting menstruum appropriate for retaining the active matter in solution.

As regards the means for their preservation from decomposition, alcohol and sugar have been employed, as the cases demanded, and in a few instances acetic acid is added for special reasons. The process of percolation has been almost invariably used, as best adapted to effect the desired objects, and the formulæ, both in manipulation and quantities, are based on the supposition that they are to be carried out in the shop or laboratory of the apothecary, and not on the large scale by the manufacturer.

Where alcohol has been used as the agent for preservation, it has been employed in the form of the first dense solution obtained in the percolation, regulating the quantity reserved for this purpose by the quantity of alcohol to be retained in the fluid extract, and evaporating the weaker liquors till reduced to a bulk sufficient to make up the required measure by an indirect heat of about 150° F. in an open vessel.

When sugar has been employed as the preservative agent, it is added to the percolate before the completion of the evaporation, so as to take advantage of the well ascertained solvent power of sugar in regard to resinous and apothemic matter.

A new class of oleoresinous fluid extracts has been suggested in which the stronger aromatics have been introduced, such as cloves, cinnamon, cardamom, &c., and which possess, for certain uses, very desirable advantages from their concentration.

The number of oleoresins has been considerably increased on the ground that they represent their respective sources more completely, and in smaller bulks than any other form of fluid or semifluid extracts. For this reason also it is insisted that they should occupy a distinct position under the name of "Oleoresins," and thus avoid the necessity of making a discrepancy in the proportional strength of all those preparations which go by the name of fluid extracts.

In bringing forward so large a number of fluid extracts, it is not intended to recommend that all of them should be introduced into the Pharmacopœia, but to afford sufficient scope in

the choice to be made by the framers of that codex, assuming the processes to yield satisfactory products.

Class First.

EXTRACTUM ACONITI FOLIORUM FLUIDUM.

Take of Aconite leaves in powder (No. 60*) 16 ounces, Troy.
Alcohol. Water, of each a sufficient quantity.

Mix two pints of alcohol with one of water, moisten the powder evenly with four fluid ounces of the mixture, pack it firmly in a percolator, and having covered the surface with a disc of cloth† gradually pour on the same menstruum until three pints have passed; reserve the first twelve fluid ounces, evaporate the remainder at 150° F. on a water bath to four fluid ounces, mix it with the reserved tincture, and after standing twenty-four hours filter through paper.

In the same manner prepare

EXTRACTUM BELLADONNÆ FLUIDUM.

From Belladonna leaves, in powder.

EXTRACTUM BUCHU FLUIDUM.

From Buchu, in powder. No. 40.

EXTRACTUM DIGITALIS FLUIDUM.

From Digitalis, in powder.

EXTRACTUM HYOSCYAMI FLUIDUM.

From Henbane leaves, in powder.

EXTRACTUM MATICO FLUIDUM.

From Matico, in powder.

EXTRACTUM STRAMONI FLUIDUM.

From Thorn Apple leaves, in powder.

EXTRACTUM VALERIANÆ FLUIDUM.

From Valerian, in powder.

REMARKS. — In this class are placed the narcotic leaves, and certain oleo-resinous substances. Aconite and Valerian will represent them. When these substances, reduced to a powder that will pass a sieve of 60 meshes to the linear inch, are uniformly moistened, by rubbing, with a fourth of their weight of the alcoholic mixture, they are yet pulverulent, but exhibit a damp appearance, and readily pack in the percolator. Glass funnels answer a good purpose, but cylindrical percolators may be employed. In either case, if the

* "No. 60" indicates that the sieve through which the powder is passed, has 60 meshes to the linear inch — and so of other numbers.

† By this is intended a circular piece of muslin, linen or lint, or any insoluble porous tissue to prevent the disturbance of the powder. Filtering paper perforated with holes will do, but the disc of cotton cloth is cheap and to be preferred. The pieces need not be thrown away, but may again be used after washing.

powder has been properly compacted, the menstruum when added passes very deliberately, by drops, and it will be found that the proprotion of the percolate which is directed to be reserved will contain nearly all of the most valuable parts of the drug. In this way the action of heat and air is entirely prevented on the most important part of the extracted matter, and where volatile oils are concerned this fact is particularly important. It is surprising what concentrated liquors are thus obtained when the trouble is taken to pass the powder through a sieve of the fineness indicated. It will be observed that the process adopted for this class, is nearly that of Prof. Graham, for fluid extract of Valerian. It will require strict attention to the details of the process to get the results intended, because success depends on the slowness of the percolation without any regulation at the outlet of the funnel.

The alcoholic condition of the resulting preparations is nearly 50 per cent. In this fluid the chlorophylle is but partly soluble, and much of this principle is left in the exhausted residue.

Class Second.

EXTRACTUM ACONITI RADICIS FLUIDUM.

Take of Aconite root, in powder, (No. 60) 16 ounces, Troy.
Alcohol, (sp., gr., .835) a sufficient quantity.

Moisten the powder with six fluid ounces of alcohol, pack it firmly in a cylindrical percolator, cover the surface with a disc of cloth, and gradually pour on alcohol until three pints of tincture have passed, reserving the first half pint. . The remainder of the tincture is then distilled till reduced to half a pint and while hot mixed with reserved tincture. After standing twenty-four hours filter through paper.

In the same manner prepare

EXTRACTUM CIMICIFUGÆ FLUIDUM.

From Black Snakeroot in fine powder.

EXTRACTUM HELLEBORI FLUIDUM.

From Black Hellebore in fine powder.

EXTRACTUM IPECACUANHÆ FLUIDUM.

From Ipecacuanha in fine powder.

EXTRACTUM JALAPÆ FLUIDUM.

From Jalap in fine powder.

EXTRACTUM PODOPHYLLI FLUIDUM.

From Mayapple root in fine powder.

EXTRACTUM SANGUINARIÆ FLUIDUM.

From Bloodroot in powder.

EXTRACTUM VERATRI VIRIDIS FLUIDUM.

From American Hellebore root, in powder.

REMARKS. — The powders for this class of extracts should be, at least, so fine as to pass through a sieve 60 meshes to the linear inch, and even dusted Jalap and Ipecacuanha may be employed with advantage. To test the extracts, all that was contained in the original tinctures, including the sediment caused by the evaporation, was retained in the vials without filtration as directed in the recipe, so as to observe the effects of keeping. In the case of Jalap a very slight deposit of resinous matter adhered to the bottom. In the Cimicifuga and Podophyllum a little more of a pulverulent and flocculent consistence separated, but in quantity too small to materially affect the activity of the preparations, even if resinous in its nature. The fluid extract of Ipecac will be the proper means of making the syrup, and properly diluted it affords a very energetic emetic. The alcoholic strength of these fluid extracts is about 50 per cent.

Class Third.

EXTRACTUM COLCHICI RADICIS FLUIDUM.

Take of Colchicum root in powder, (No. 50,) 16 ounces,
Diluted alcohol, a sufficient quantity.

Mix the Colchicum powder with four fluid ounces of the diluted alcohol, pack it closely in a percolator, cover the surface with a disc of cloth, and gradually add more of the diluted alcohol until three pints of tincture have passed, reserving the first twelve fluid ounces. Evaporate the remainder of the tincture at 150° Fahr. to four fluid ounces, mix it with the reserved tincture, and after standing twenty-four hours, filter through paper.

In the same manner prepare

EXTRACTUM COLOMBÆ FLUIDUM.

From Columbo, in powder, No. 40.

EXTRACTUM CHIRAYTÆ FLUIDUM.

From Chiretta, in powder, No. 50.

EXTRACTUM EUPATORII FLUIDUM.

From Boneset, in powder, No. 50.

EXTRACTUM GENTIANÆ FLUIDUM.

From Gentian, in powder, No. 50.

EXTRACTUM SCILLÆ FLUIDUM.

From Squill, in powder, No. 30.

EXTRACTUM SENEGÆ FLUIDUM.

From Seneka, in powder, No. 50.

EXTRACTUM SERPENTARIÆ FLUIDUM.

From Virginia Snakeroot, in powder, No. 60.

REMARKS. — In making Fluid Extract of Colchicum, by this formula, a whitish colored sediment is deposited from the reserved tincture by standing,

and also by the evaporation of the last liquors, and after the mixture of the two the quantity seemed to slightly increase. The nature of this matter has not been determined, but it is believed to be identical with that deposited from the wine, and in no wise connected with the activity of the preparation. It is well, therefore, in this instance, to postpone the filtration of the fluid extract when not wanted for immediate use. It is highly probable that this substance may be avoided by employing concentrated alcohol to extract the root, and subsequently distilling off sufficient of it to reduce the alcoholic strength of the fluid extract to that above exhibited, which is about 25 per cent.

In regard to the permancy of Fluid Extract of Seneka, there is some doubt, theoretically, owing to the tendency of an alcoholic solution of Seneka to deposit polygalic acid in cool weather. It remains to be observed whether this will prove an objection to the formula. Made with sugar, it has been known to gelatinize and lose its fluidity, possibly owing to the action of the pectin, or pectic acid which is known to be an ingredient of the root.

From the gummy nature of Squill, it is necessary to use a coarser powder than would be proper for most other substances.

Columbo in its behavior with diluted alcohol is analogous to Rhubarb. If very fine, the percolation is too tardy — hence a coarser powder is directed.

Fluid Extract of Serpentaria fully represents that drug when made by this formula. It is possible the weak alcoholic menstruum may not be so highly approved as a saccharine one, but it may be sweetened before using.

Class Fourth — Saccharine Fluid Extracts.

EXTRACTUM CINCHONÆ FLUIDUM.

Take of Yellow Peruvian bark, in powder, (No. 50,) . 16 ounces, Troy.
Sugar, ... 10 ounces.
Diluted alcohol, a sufficient quantity.

Moisten the Peruvian Bark with half a pint of diluted alcohol, let it stand half an hour, pack it in a percolator firmly, cover it with a disc of cloth, and gradually add diluted alcohol till three pints of tincture have passed. Evaporate the tincture at a moderate heat on a water bath to one pint, add the sugar, and continue the evaporation till reduced to one pint, and strain while hot.

In the same manner prepare

EXTRACTUM CHIMAPHILÆ FLUIDUM.

From Pipsissewa, in powder, No. 50.

EXTRACTUM DULCAMARÆ FLUIDUM.

From Bittersweet, in powder, No. 50.

EXTRACTUM GALLÆ FLUIDUM.

From Galls, in powder, No. 40.

EXTRACTUM GERANII FLUIDUM.

From Cranesbill, in powder, No. 50.

EXTRACTUM GRANATI RADICIS FLUIDUM.

From Pomegranate root bark, in powder, No. 60.

EXTRACTUM RUBI FLUIDUM.

From Blackberry root, in powder, No. 50.

EXTRACTUM SARSAPARILLÆ FLUIDUM.

From Sarsaparilla, in powder, No. 50.

EXTRACTUM SPIGELIÆ FLUIDUM.

From Pink root, in powder, No. 50.

EXTRACTUM UVA URSI FLUIDUM.

From Uva Ursi, in powder, No. 50.

REMARKS. — The astringent and apothemic drugs are less liable to decompose with a saccharine menstruum than with an alcoholic liquid. A decided advantage is gained by adding the sugar before the completion of the evaporation, and in some cases it might be better to add the sugar at first, and evaporate the alcohol afterwards.

When carefully prepared, as described in the formulæ, these fluid extracts are dense, clear, dark-colored solutions, with the exception of the Cinchona. This is, as in the preparation of Mr. Taylor, (which is of half the strength,) a reddish-brown, opaque, syrupy liquid, highly charged with the properties of Calisaya bark. It has not been sought to render this a clear solution by excluding the precipitate of cinchotannates of the alkaloids, which occurs by cooling, nor to modify and render it soluble by the use of acids. If it should be determined to make the preparation clear, in case it is adopted into the Pharmacopœia, it may be better to evaporate the tincture to one-fourth, let it stand till cool, strain out the precipitate, add the cloudy liquid to the sugar, and when dissolved evaporate till reduced to a pint by a water bath heat. The small portion of undissolved matter that occasions the cloudiness of the liquid will be dissolved by the sugar during the heating process. The fluid extract of Blackberry root, is an admirable astringent addition to diarrhœa mixtures, as those of Nutgalls and Cranesbill are to gargles.

The fluid extracts of Chimaphila, Dulcamara, Pomegranate, Spigelia, and Sarsaparilla, fully represent the several drugs, and by dilution with three times their bulk of simple syrup afford syrups of the ordinary strength.

Class Fifth. — Acetic Fluid Extracts.

EXTRACTUM ERGOTÆ FLUIDUM.

Take of	Ergot, in fine powder, (No. 60,) . .	16 ounces.
	Acetic acid, ...	half a fluid ounce.
	Diluted alcohol, ...	a sufficient quantity.

Mix the acid with three pints of the diluted alcohol, moisten the ergot uniformly with half a pint of the mixture, pack it in a conical percolator, cover it with a disc of cloth, and add gradually the remainder of the acidulated alcohol, reserving the first twelve fluid ounces of tincture, and continuing the process until three pints more have passed, using diluted alcohol at the last. Evaporate this last portion to four fluid ounces, at a temperature not exceeding 150° F., mix it with the reserved tincture, and filter through paper.

In the same manner prepare

EXTRACTUM CONII FLUIDUM.

From Hemlock leaves, in powder, No. 60.

EXTRACTUM LOBELIÆ FLUIDUM.

From Lobelia leaves, in powder, No. 60.

REMARKS.—In each of the drugs yielding these fluid extracts, there exists an alkaloid united with an organic acid, as a salt, which is so unstable in its nature, as in each case to be partially decomposed by the ebullition of its solution. This is more particularly the case with Conium and Ergot. The acetic acid controls this tendency almost completely, below 150° Fahr. It will be observed that this formula differs from that proposed two years ago in a report to the Association, in which Ether was employed to remove the fixed oil. Ergot percolates more readily and effectually after the removal of the oil by Ether, than before, but when it is reduced to a powder by a sieve of 60 meshes per inch, it is readily exhausted by slow percolation with the precautions indicated. Further, the fluid extract prepared in this manner has been carefully tested, during twelve months, by several practitioners who are satisfied of its efficiency.

The fluid extracts of Conium and Lobelia made in this way, from the carefully dried plants, are quite unexceptionable.

Class Sixth. Oleoresinous Fluid Extracts.

EXTRACTUM CAPSICI FLUIDUM.

Take of Capsicum, in powder, No. 50, sixteen ounces.
Alcohol (deodorized) a sufficient quantity.

Moisten the Capsicum with four fluid ounces of the alcohol, pack tightly in a percolator, cover the surface with a disc of cloth, and pour on alcohol gradually until two pints have slowly passed. Reserve the first twelve fluid ounces, and evaporate the remainder to four fluid ounces by a gentle heat not exceeding 150° Fahr., mix it with the reserved tincture, and filter through paper.

In the same manner prepare

EXTRACTUM CANELLÆ FLUIDUM.

From Canella, in powder. No. 60.

EXTRACTUM CARDAMOMI FLUIDUM.

From Cardamom, in powder. No. 50.

EXTRACTUM CARYOPHYLLI FLUIDUM.

From Cloves, in powder. No. 50.

EXTRACTUM CINNAMONI FLUIDUM.

From Ceylon Cinnamon, in powder. No. 60.

EXTRACTUM CUBEBÆ FLUIDUM.

From Cubebs, in powder. No. 50.

EXTRACTUM INULÆ FLUIDUM.

From Elecampane, in powder. No. 60.

EXTRACTUM IRIDIS FLORENTINÆ FLUIDUM.

From Orris root, in powder. No. 60.

EXTRACTUM LUPULINÆ FLUIDUM.

From Lupulin.

EXTRACTUM MYRRHÆ FLUIDUM.

From Myrrh, recently powdered. No. 30.

EXTRACTUM PYRETHRI FLUIDUM.

From Pellitory root, in powder. No. 50.

EXTRACTUM PIMENTÆ FLUIDUM.

Take of Allspice, in powder. No. 50.

EXTRACTUM XANTHOXYLI FLUIDUM.

From Prickly Ash bark, in powder. No. 60.

EXTRACTUM ZINGIBERIS FLUIDUM.

From Jamaica Ginger, in powder. No. 60.

REMARKS. — This is a new class of Fluid Extracts embracing the more important aromatics, and stimulants owing their virtues to oleoresins. By the employment of Atwood's deodorized alcohol of 95 per cent., the menstruum does not depreciate the odors, and when the concentrated portion is added, but little if any precipitation occurs. Several of the extracts are more appropriate for dental purposes than medicine, instance the Pellitory, Elecampane, Xanthoxylum, Orris, and Myrrh, although most of them may be used in medicine. The Fluid Extract of Cubebs as thus made has some advantages over the oleoresin in mixtures that are not emulsive. The preparations of cloves, cardamom and ginger are admirable carminatives for pills or mixtures, and the capsicum affords a stimulant for external application well fitted as an addition to liniments, where a decided impression is needed.

By combining the fluid extracts of ginger, cloves and cinnamon in the proportion of a fluid ounce of the former to half a fluid ounce each of the two latter, a liquid is obtained, which, when applied by means of two or three layers of lint or Canton flannel, saturated, affords an excellent extemporane-

ous spice plaster. Or a compound fluid extract may be made by the following formula:

EXTRACTUM AROMATICÆ FLUIDUM.

Take of Ginger, in powder	. . .	8 ounces.
Cloves "	. . . .	4 ounces.
Cinnamon "	. . . .	4 ounces.
Alcohol	. . . . .	a sufficient quantity.

Mix the powders, moisten them with four fluid ounces of alcohol, pack them in a percolator, cover the surface with a disc of cloth, and pour on alcohol until two pints have slowly passed. Reserve the first twelve fluid ounces, evaporate the remaider to four fluid ounces, and mix it with the reserved tincture and filter.

When it is desirable to increase the stimulation of this application, add a small quantity of capsicum.

In the preparation of these fluid extracts, the powders should be as fine as possible, provided the substances are not injured thereby. In the case of myrrh, the tears alone should be used, reduced to powder simply, by trituration without sifting.

EXTRACTUM RHEI FLUIDUM.

Take of Rhubarb, in powder.	No. 40 . .	16 ounces, Troy.
Sugar .	. . . . .	8 ounces.
Alcohol	. . . . .	a pint.
Diluted Alcohol	. . .	a sufficient quantity.

Moisten the rhubarb with four fluid ounces of the alcohol, pack it moderately in a conical percolator, cover it with a disc of cloth and pour on the remainder of the alcohol; when it has disappeared from the surface, continue the percolation with diluted alcohol until three pints have passed, observing to separate the first pint and set it aside in a warm place till reduced to six fluid ounces. Add the sugar to the other two pints, evaporate it to ten fluid ounces, and whilst hot mix it with the concentrated reserved tincture, and strain if necessary.

REMARKS. — This formula differs but little from the officinal. The use of strong alcohol, at first, enables the operator to extract the more valuable ingredients, and get them in a concentrated form without injury from heat. The six fluid ounces of result from the evaporation of the first tincture is a thick molasses-like liquid containing nearly all the resinous and odorous matter of the root. During the evaporation of the last tincture, after adding the sugar, the alcohol is more rapidly dissipated if it is frequently stirred with a spatula. It is important to free the preparation as much as possible from alcohol, in evaporating the saccharine portion, to prevent the crystallization of the sugar, as enough of alcohol is retained in the first liquid to supersede the necessity of adding the tincture of ginger. It will be noted that the aromatics have been omitted from this formula. This has been done for the following reasons: 1st.

Fluid extract of rhubarb is generally prescribed with other medicines, in which case it is easy to add the aromatics according to the preference of the prescriber. 2d. Their presence covers up to a considerable extent the peculiar distinctive odor and taste of the drug, and thus prevents a correct judgment of the perfection of the preparation. 3d. When free from the aromatics, the fluid extract affords a means of making the simple syrup of rhubarb extemporaneously, that is very convenient in warm weather.

EXTRACTUM SENNÆ FLUIDUM.

Take of	Senna, in powder. No. 60. . .	16 ounces, Troy.
	Sugar	8 ounces, Troy.
	Diluted Alcohol	a sufficient quantity.

Moisten the senna with four fluid ounces of diluted alcohol, and pack it in a conical percolator, cover it with a disc of cloth, and pour on diluted alcohol until three pints have slowly passed. Reserve the first pint, and in a warm place let it evaporate to half a pint. To the remaining two pints of tincture add the sugar, and in a water bath concentrate the solution to half a pint, and mix it with the concentrated tincture, and strain if necessary. When it is desirable to aromatize this fluid extract, add sixteen minims of oil of cloves dissolved in half a fluid ounce of tincture of ginger to the quantity of the formula.

REMARKS. — In this formula, it will be observed, the aromatics and Hoffman's Anodyne are omitted. If the senna is passed through a sieve 50 or 60 meshes to the inch, and a funnel-shaped percolator used, the first pint of tincture will contain most of the valuable portion of the senna, and by the precautions suggested in its evaporation, it is not injured by the process. The reasons for omitting the aromatics are the following: 1st. The quality of the preparation, when finished, can be better determined by its odor and taste. 2d. The fluid extract can be employed to make the fluid extracts of Senna and Spigelia and Senna and Rhubarb extemporaneously when desired. 3d. The aromatics can be added when required, or varied to suit the taste of the physician or patient. 4th. The proportion of alcohol retained in the preparation is sufficient to keep it from spoiling without Hoffman's Anodyne.

EXTRACTUM SPIGELLÆ ET SENNÆ FLUIDUM.

Take of	Pinkroot, in powder, No. 60 . .	10 ounces, Troy.
	Senna, in powder, No. 50 . .	6 ounces, Troy.
	Sugar	10 ounces, Troy.
	Carbonate of Potassa . .	4 drachms.
	Oil of Caraway and Anise . . .	each 10 minims.
	Diluted Alcohol . . .	a sufficient quantity.

Mix the Pink Root and Senna intimately together, moisten them with half a pint of diluted alcohol, pack the mixture in a conical percolator, cover the

surface with a disc of cloth, and pour on diluted alcohol until three pints have passed, reserving the first pint. Evaporate the reserved tincture at a gentle heat till reduced to six fluid ounces, mix the sugar with the remainder, and evaporate it to ten fluid ounces, mix this with the concentrated tincture, and having triturated the oils with the carbonate of potassa, dissolve them in the fluid extract, and strain.

Fluid Extract of Senna and Pinkroot may also be prepared in the following manner:

Take of Fluid Extract of Pinkroot, . . . 10 fluid ounces.
Fluid Extract of Senna, ... 6 fluid ounces.
Carbonate of Potassa, ... half an ounce.
Oil of Caraway and Oil of Anise, each . 20 minims.

Mix the fluid extracts and dissolve in them the carbonate and oils previously triturated together.

Remarks. — Fluid Extract of Spigelia and Senna made by the above recipes varies slightly, theoretically, from the officinal; the proportion of the two main ingredients is slightly varied so as to make them, taken together, an ounce to the fluid ounce. The manipulation is calculated to afford a better preparation than the officinal recipe. The second formula will be found a great convenience in making the preparation extemporaneously, in the quantity it may be needed.

EXTRACTUM RHEI ET SENNÆ FLUIDUM.

Take of Fluid Extract of Rhubarb, . . . 4 fluid ounces.
Fluid Extract of Senna, . . . 12 fluid ounces.
Bicarbonate of Potassa, in powder, . . half an ounce.
Tincture of Ginger, ... 1 fluid ounce.
Oil of Cloves, ... 8 minims.
Oil of Anise, ... 16 minims.

Dissolve the Bicarbonate of Potassa in the fluid extracts, and add to them the oils previously dissolved in the tincture of ginger, and mix them.

Remarks. — This preparation is an extemporaneous imitation of a recipe published in the 25th volume of the American Journal of Pharmacy, page 23. It is believed to possess sufficient merit to have a place in a general collection of the fluid extracts.

EXTRACTUM SARSAPARILLÆ FLUIDUM COMPOSITUM.

Take of Sarsaparilla, in powder, No. 30, . 12 ounces, Troy.
Dulcamara, in powder, No. 30,
Guaiacum wood, rasped,
Pipsissewa, in powder, No. 30, each . 4 ounces, Troy.
Liquorice Root, in powder,
Sassafras Bark, in powder, each . . 2 ounces, Troy.
Sugar, ... 10 ounces, Troy.
Diluted Alcohol, ... a sufficient quantity.

Mix the Sarsaparilla, Dulcamara, Guaiacum, Pipsissewa, and Liquorice Root intimately together, moisten them with two pints of diluted alcohol, allow them to macerate twenty-four hours in a covered vessel, pack them tightly in a cylindrical percolator, and pour on diluted alcohol until five pints have slowly passed. Moisten the Sassafras with a fluid ounce of the tincture, pack it in a percolator and pour on more of the tincture till two fluid ounces have passed. Evaporate the remainder of the tincture on a water bath to a pint, add the sugar, continue the evaporation till reduced to 14 fluid ounces, add the tincture of sassafras, mix them and strain, so as to get a pint of fluid extract.

REMARKS. — The writer is aware of the difficulty that will present in following rigidly the directions of this formula, owing to the trouble of obtaining the ingredients in powder. This is, however, not insuperable, either with the mortar on a small scale or through the drug grinder in quantity. Yet in view of the probability of the ingredients being used in very coarse powder, it has been directed to mix them intimately and macerate in sufficient menstruum to saturate them, then to pack them tightly in the percolator. On a small scale it will, under these circumstances, be found advantageous to beat the ingredients in a mortar before packing. On a large scale, digestion for a time in hot dilute alcohol at 150° in a close vessel, will aid greatly in the subsequent extraction by percolation.

It will be observed that very material changes are suggested in this formula. As it now stands in the Pharmacopœia, this preparation is little different from the simple fluid extract, for which a formula has been given in the fourth class. The introduction of Dulcamara, Pipsissewa, and Guaiacum is the result of an experience of twenty years in the preparation of such an extract, and competent medical testimony in favor of its efficiency. The manner of treating the Sassafras involves but little trouble, and while it effectually communicates the properties of that aromatic, it also introduces a little alcohol, which insures the stability of the preparation.

EXTRACTUM TARAXACI FLUIDUM.

Take of Taraxacum, in powder, (No. 50,) . . 16 ounces, Troy.
Diluted Alcohol, ... a sufficient quantity.

Moisten the Taraxacum with four fluid ounces of diluted alcohol, pack it in a conical percolator, cover it with a disc of cloth, and pour on diluted alcohol until three pints have gradually passed. Reserve the first half pint, and evaporate the remainder at 120° Fahr., till reduced to half a pint, mix it with the reserved tincture and filter.

Fluid extract of Taraxacum may also be made from the fresh root by the following process, viz:

Take of recent Dandelion Root, (gathered in Autumn,) 24 ounces.
Alcohol, ... half a pint.

Bruise the root to a pulp, mix it intimately with the alcohol, and after maceration for a week express strongly and filter to get two pints of fluid extract.

REMARKS.—The first formula is the "Liquor Taraxaci" of the English pharmaceutical chemists, and it is a good preparation when made in the manner described. The second formula is the "Preserved juice of Taraxacum," now in use in Philadelphia, and which merits a place in the Pharmacopœia. The object of maceration for a week is, that the cellular tissue of the root may be softened, so as to yield more freely to pressure.

EXTRACTUM GLYCYRRHIZÆ FLUIDUM.

Take of Extract of Liquorice (Calabria) . . 8 ounces, Troy.
Sugar, in powder, ... 10 ounces, Troy.
Water, ... a sufficient quantity.

Bruise the extract till reduced to pieces about the size of a pea, enclose it in a gauze cloth, suspend it in a pint vessel, cover it with water, let it stand 12 hours, pour off the dense liquor, renew the water, and again macerate for 12 hours. Drain the liquor from the undissolved portion of extract, mix it with the first liquid, evaporate to 12 fluid ounces, strain if necessary, dissolve in it the sugar, and evaporate till the fluid extract measures a pint.

REMARKS.—This preparation is intended to facilitate the dispensing of extract of liquorice in cough mixtures. As usually prescribed by physicians, the insoluble sediment is contained in the mixtures, and always gives them an unsightly appearance. Each fluid ounce represents half an ounce of the extract, and more than an ounce of the root. This preparation keeps pretty well, except in hot weather, but it is better not to make it in large quantity. If too long kept, carbonic acid is eliminated.

EXTRACTUM PRUNI VIRGINIANÆ FLUIDUM.

Take of Wild Cherry Bark, in powder, No. 60, . 16 ounces, Troy.
Sweet Almonds, ... 2 ounces, Troy.
Sugar, in powder, ... 12 ounces, Troy.
Alcohol, .835,
Water, of each, ... a sufficient quantity.

Moisten the bark with four fluid ounces of alcohol, pack it in a percolator, cover it with a disc of cloth, and pour on alcohol until three pints have slowly passed. By means of a distillatory apparatus, regain two pints and a half of the alcohol. Mix the residue with half a pint of water, and evaporate it to half a pint, or until the alcohol is dissipated. Beat the almonds, without blanching, to a smooth paste with four fluid ounces of water, mix this with the extractive solution in a well stoppered bottle, and agitate occasionally for 24 hours. The contents of the bottle are then thrown on a cloth filter, strongly and quickly expressed, and if the expressed liquid does not measure 12 fluid ounces, add water to the residue and again express till sufficient is obtained. Having placed the sugar in a bottle marked for a pint, filter the expressed liquid from a close funnel into the bottle, which should be occasionally agitated, until, when the liquid has passed, and the sugar is all dissolved, the fluid extract shall measure a pint.

REMARKS. — The propriety of doubling the strength of this fluid extract, in obedience to the rule adopted of making all fluid extracts an ounce to the fluid ounce, may well be doubted, as it reduces the dose to half a teaspoonful, and requires very careful manipulation to retain all the virtues of the bark in so small a space. Nevertheless the product obtained, like that of the original formula, (Amer. Jour. Pharm., 1856,) well represents the drug, and deserves a place among the fluid extracts worthy of adoption.

EXTRACTUM KRAMERIÆ FLUIDUM.

Take of Rhatany root in powder (60 to the inch) .	16 ounces.
Sugar	12 ounces.
Water	a sufficient quantity.

Moisten the Rhatany with half a pint of water, let it stand an hour, pack it closely in a conical percolator, cover it with a disc of cloth, and pour on water until four pints have slowly passed. Evaporate the liquor on a water bath of 12 fluid ounces, add the sugar, and continue the evaporation until the whole measures a pint, and strain.

Thus prepared, fluid extract of Rhatany is about two and a half times the strength of the officinal syrup, and affords a very elegant astringent preparation for mixtures. At first it was determined to prepare this extract by the formula for the Fluid Extract of Cinchona, and when so made it is evidently charged with the astringency of the drug, but the result is an opaque syrupy liquid, which by dilution with water gives a precipitate of apotheme. It is absolutely necessary to have the Rhatany in a uniform powder to succeed by the above recipe, so that the percolation in an unobstructed funnel shall be quite slow.

EXTRACTUM JUGLANDIS FLUIDUM.

Take of Butternut bark, finely bruised, ...	16 ounces.
Sugar, ...	12 "
Alcohol, Water, of each, ...	a sufficient quantity.

Mix one part of alcohol with three parts of water, put the bark in a suitable, close vessel, pour over it two pints of the diluted alcohol, and digest at a temperature not exceeding 120° for twenty-four hours, and express strongly. Return the marc to the vessel and again digest in two pints of the mixture for twelve hours, and express. Unite the liquids, evaporate them over a water bath to ten fluid ounces, filter the liquor, and dissolve in it the sugar, and strain so as to make a pint of fluid extract.

In the same manner prepare

EXTRACTUM QUASSIÆ FLUIDUM,

From Quassia, finely rasped.

REMARKS. — It would have been preferable to place Fluid Extract of Butternut in the fourth class, and Quassia in the third class, but for the difficulty presented by their texture. Under the circumstances the above will afford

a means open to all operators. With proper care the results are excellent preparations.

Oleoresinæ.

OLEORESINA CAPSICI.

Take of Capsicum, in powder, No. 50, ... 16 ounces.
Ether, ... a sufficient quantity.

Pack the Capsicum tightly in a percolator for volatile liquids, cover it with a disc of cloth, pour on the ether until two pints of fluid have passed. Put this in a retort, and by aid of a water bath distil a pint and a half of ether into a refrigerated receiver. Expose the residue in the retort in an open capsule, till the remains of the ether have passed off, and preserve the oleoresin.

In the same manner prepare

OLEORESINA CARDAMOMI.

From Cardamom seeds, in powder. No. 50.

OLEORESINA CARYOPHYLLI.

From Cloves in fine powder. No. 50.

OLEORESINA CUBEBÆ.

From Cubebs in fine powder. No. 50.

OLEORESINA FILICIS MARI.

From male Fern, in powder. No. 50.

OLEORESINA LUPULINÆ.

From Lupulin.

OLEORESINA PIPERIS NIGRI.

From Black Pepper, in powder. No. 50.

OLEORESINA PYRETHRI.

From Pellitory root, in powder. No. 50.

OLEORESINA SABINÆ.

From Savin, in powder. No. 50.

OLEORESINA XANTHOXYLI.

From Prickly Ash bark, in powder. No. 50.

OLEORESINA ZINGIBERIS.

From Jamaica ginger, in Powder. No. 60.

Remarks. — Of these Oleoresins, those of capsicum, cubebs, pepper, cloves, lupulin, savin and ginger, possess decided merit. That of cardamom is a liquid, consisting of one-third volatile oil and two-thirds fixed oil, with but little resinous matter. The male fern is used in Europe and occasionally here. The Xanthoxylum as used by the Eclectics is prepared by another formula. The list might be much extended, but even that submitted is longer than will be accepted. The oleoresin of savin incorporates easily with resin cerate, and affords the most elegant form of savin cerate yet suggested.

In conclusion it may be again remarked, that the formulæ are all such as the pharmaceutists may practise in the shop; they do not involve much expenditure of apparatus, and when attention is given to the division of the powders and the manipulation of the percolation as directed, the result will, it is believed, generally give satisfaction. It is quite possible that some of them by keeping a length of time will deposit sediment, the result of a disturbance in the balance of the solubilities. This may be expected, but, except in few instances, it has no influence on the medicinal power of the extract.

It is proper before leaving the subject to extend a caution in reference to such of the above formulæ as are suggested as substitutes for the present officinal fluid extracts that differ in strength or composition from them — that they should not be used until sanctioned by authority, yet the improved manipulation may be applied where it does not alter the character of the preparations.

Philadelphia, September 4th, 1859.

WINE OF IPECACUANHA.

"What is the cause of its tendency to deposit a sediment? — has that sediment any medical value? — and can the deposition be avoided by substituting another alcoholic menstruum of the strength of wine?"

The above queries were accepted by me as subjects of inquiry, and to report upon some two years since. The circumstances that have heretofore prevented me from reporting have already been explained. It is now my purpose to read a few thoughts that I have written upon the subject.

Though I must first premise by stating, that my deductions are not based upon any very thorough experiments — that I have attempted no ultimate analysis of the sediment in question, for, to my mind, neither that which is required by the shops daily routine, nor the courses of study as pursed in our colleges of pharmacy, fit the pharmaceutist for that nice research into the ultimate constituents of bodies, that owe to accuracy of manipulation, and correct deduction, their whole value.

Such research belongs more properly to the analytic chemist — to his care I leave this portion of the subject, merely intending to treat it as one of practical pharmacy. In February last I made thirty-two ounces of wine of ipecacuanha — sixteen ounces of which were made in conformity with our pharmacopœia — the remaining sixteen in the same manner, with the exception that the sherry wine used was strengthened by the addition of one-eighth of its bulk of alcohol.

Each of these vinous tinctures was put into eight ounce vials, and one vial of each kind was securely corked and sealed, so as to exclude air.

The remaining two were loosely corked so as to place them as nearly as possible under the same exposure to atmosphere as they would undergo if in the ordinary dispensing bottle of the shop.

The vials were from time to time examined — a sediment was found to be forming in each, more rapidly, however, in the unsealed than in the sealed vials; the strength of the wine, much to my surprise, did not appear to affect the bulk of the matter deposited. Eight ounces of wine of ipecac, after standing in a loosely corked vial about six months, yielded a sediment weighing about eight grains. It was insoluble both in alcohol and in water; soluble in boiling alkaline solutions; soluble in ammonia, from which it is precipitated by an acid.

Incinerated, a small quantity of ash remains, resulting probably from a deposit of tartar by the wine.

Boiled with water, it gave no indication of starch upon the addition of tincture of iodine.

Boiled with alcohol, no trace of emetia could be detected in the alcohol used.

To the question, what is this sediment, I make no direct reply, other than that it is not peculiar to the wine of ipecacuanha — that we have analogous sediments deposited in most of our medicated wines and tinctures when long kept — for example, such a deposit may be found in the tinctures of gentian, of squills, of orange peel, of peruvian bark, in the wine of colchicum, of opium, and many others.

That a like body is formed during the evaporation of extracts, and also frequently in the finished extract when long and carefully kept. The substance, in this instance, being recognized under the name of extractive matter or apothem.

That we again find an analogous body in the so-called humus or ulmine, which plays so important a part in the composition of all soils susceptible of profitable cultivation. The substance being formed in this instance by the slow decay, or most probably, oxidation of the vegetable matter in the soil. The same cause acting, doubtlessly, whether the substance be formed in a wine, a tincture, or in the soil. Do not understand me to say that the deposit, found in wine of ipecacuanha, is identical in its ultimate chemical composition with the extractive, the apotheme, the humus, as it may be termed as derived from one or the other source. I assert nothing of the kind; — each I believe to be a complex body, varying in exact composition with the source and circumstances from and under which it may have been formed — that the deposit that forms in many of our tinctures contains coloring matter in an unaltered condition — that when a preparation holds tannic acid in solution, and its activity depends upon some alkaloid, that a precipitate will result from the formation of an insoluble compound of the two, as the natural combinations of the substance are broken up. That, in such a case, the medicinal activity of the preparation will be impaired; that, nevertheless, the great bulk of all these sediments is apothem — that there is sufficient sameness in their properties, in the manner of their formation, in their chemical reactions to justify their classification under one common head; they are all, so far as I

have had the opportunity to test the matter, alike insoluble in alcohol and in water, and are soluble in alkaline solution and in ammonia, from which they are precipitated by an acid.

That although derived from different sources, and formed under diverse influences, that they are all brought into being in obedience with that natural law that causes all organic matter to pass into such form that it may, in turn, serve to nourish other organisms; that no matter how we may alter or retard this change, that the tendency is at all times the same; that emetia, in common with other vegetable matters, held in solution in the wine of ipecacuanha goes to swell the bulk of the deposit, is, I think, a fair deduction. Viewing the matter, however, wholly as a question of pharmacy, looking at the small quantity of the deposit obtained after six months exposure, the absence of any appreciable emetia in the deposit, we may conclude, that in practice, the pharmaceutist need pay but little attention to this sediment. Let him use good sound wine, or perhaps, preferably, a dilute alcohol, say containing from 18 to 20 per cent. Let him make no more of the wine than the legitimate demands of his business require.

Let him, in case it be necessary that any of this wine be kept a long time, put it into moderately small bottles, securely cork and seal them, and he has done all that he can do toward its preservation. Finally, the wine of ipecacuanha, as it now stands, is a good and efficient preparation and sufficiently stable for all pharmaceutical purposes. I have no alterations to suggest.

JOS. ROBERTS, Baltimore.

QUESTION ON MUSTARD.

"What is the best formula for a permanent liquid preparation of white or black Mustard seed that may be used as a substitute for Mustard Plasters."

There are several preparations in use in Europe of the kind alluded to. By distillation with water alone, mustard yields a stimulating distillate, though for the purposes named the yield is improved by the addition of alcohol, a formula ascribed to Nees Von Esenbeck, published in 1831, is as follows:

Take of fresh powdered Mustard Seed, ...	1 lb.
Alcohol, ...	2 oz.
Muriate of Ammonia, ...	½ oz.
Water sufficient.	

Distil lbiss. to lbij. — a liniment used in cholera, &c., and represented as preferable to Cantharides, Capsicum, &c., for its rubefacient effect. As a substitute for the sinapism a strip of linen or cotton cloth is to be soaked in it and applied to the skin.

Spiritus Sinapis is made as follows:

Take of freshly powdered Mustard, ...	12 lbs.
Water, ...	40 lbs.

Distil till about 3 pints have passed over, having placed 3 lbs. of water in the receiver and conducted the distillate directly into this. It now contains 6 lbs., to which is added alcohol which has been contained in a vessel connected with the receiver by a tube, and into which any volatile oil of mustard not absorbed by the water, had passed. Like the foregoing this is a powerful stimulating lotion.

We have in the country no preparations of mustard in common use, although there are formulas published for a tincture and mustard made by treating 12 pounds of mustard with 250 of alcohol, and a liniment made by infusing 1 pint of mustard in 8 of oil of turpentine.

Whitehead's Essence of Mustard is an old proprietary medicine which originated in England, but is now imitated by druggists in this country, as well as abroad.

The following is a formula used by a wholesale house in Philadelphia. I also exhibit a sample of the article.

WHILEHEAD'S ESSENCE OF MUSTARD.

Take of	Oil of Turpentine, ...	f ounces iv.
	Camphor, ...	drachms ij.
	Oil of Rosemary, ...	2 (small size)
	Mustard, ...	2 (small size)

Infuse togethor and color with a little tincture of turmeric.

Neither of these preparations answers a good purpose to substitute mustard plaster, although by friction upon the surface they produce a powerful rubefacient effect.

The volatile oil of black mustard seed is sometimes used in a diluted form as a powerful rubefacient, but it is entirely too expensive to be generally adopted, the yield being extremely small. This remarkable compound, like several other stimulating oils, does not pre-exist in the seed, but is developed by contact of moisture so that any process aiming at its production must start by the use of an aqueous menstruum. I have not experimented upon white or black mustard seed with reference to other stimulating principles giving them value as rubefacients, but it is known that much of the mustard of commerce is made from the white seed and that its stimulating properties are due in part to a similar product, though not volatile. My object in the few experiments tried has been to contrive a method of extracting all the stimulating principles including the volatile oil and to overcome the disadvantage pertaining to all the preparations for which formulæ have been given, that they are too volatile for convenient use as substitutes for mustard plaster. I confess to but little positive knowledge derived from experiments upon the subject, having been too much engrossed with more pressing duties to do justice to the subject, but give the following formula as furnishing an oily, rubefacient preparation of mustard :

Take of Black Mustard seed, in powder, . 4 ounces.
Water, ... 4 fluid ounces.
Macerate in a covered vessel for an hour,
add Alcohol, (sp. gr. .835,) . . 8 fluid ounces.
Express and add Ether, . . . 8 fluid ounces.
or sufficient. Evaporate spontaneously.

This is an oily liquid of a yellow color, consisting chifly of the fixed oil of mustard, holding in solution the pungent principles of the seed; it is less volatile than the foregoing, and highly rubefacient. It is, however, quite inferior to mustard plaster, for the purposes for which it is usually required.

The porous and yet firm consistence of the cataplasm, the fact that it does not produce a greasy stain when applied, and is always hard, makes it better for the purpose than a liquid preparation can be.

I append a good recipe for a Cataplasm of Mustard:

Take of Warm Water, ... sufficient.
Flour of Mustard, ... 4 ounces.
Rye Meal, ... 2 ounces.

Make into a paste and spread upon muslin or Canton flannel with gauze between it and the skin.

EDWARD PARRISH, Philadelphia.

REPORT ON SILPHIUM LACINIATUM.

The Silphium laciniatum, or rosin weed of our western prairies, yields a resinous exudation, in appearance like mastic.

Question. What is the character of this resinous product? Can it be substituted for mastic? And to what extent may it be collected as an article of commerce?

An answer to the above queries was expected at your last meeting, but as the intelligence of the assignment of this subject to me was not received until after the frost had killed the rosin weed, rendering it impossible for me to procure any of the gum the fall I was appointed, I was obliged to remain inactive for the season, yet hoping the following summer to obtain some samples in time to investigate the subject and make at least a partial report, but I was disappointed.

Owing to the continuous rains during the early part of the summer, the gum did not mature, and I was compelled to offer an apology instead of a report.

This season I corresponded early with my friends in different parts of the country, requesting that they would forward me some gum as soon as they could gather it, and on the 24th of August I received about an ounce from Dr. O. P. Hatheway, of Marseilles, Illinois.

With this small quantity, and at this late day, I felt it almost useless to try to make out a report, but concluded to offer you the result of my limited investigations.

1st. I find this gum to possess the general characteristics of the resins; being, when dry, solid, brittle, fusible by a moderate heat, decomposed at a higher temperature; inflammable, burning with a bright flame, with much smoke, and giving off its peculiar balsamic fumes.

It is insoluble in alcohol and water, but is dissolved by ether, chloroform, the acids and volatile oils.

When first gathered it has a strong terebinthinate odor, which is partially lost upon exposure, and a fresh balsamic aroma peculiar to itself.

As it exudes from the stalk of the plant it becomes hardened, forms in tears, varying from the size of a pin head to a large pea.

It is then of a whitish appearance, clearer than mastic, and more translucent.

Like mastic, upon chewing it becomes soft and ductile, imparting to the breath its agreeable flavor.

Its specific gravity is .833, while that of mastic is 1.074.

2d. Can it be substituted for mastic?

As far as my experiments have been conducted I find it can.

As a masticatory, it being rather softer when held in the mouth than mastic, and equally as pleasant to the taste, I consider it preferable to that gum.

It is frequently collected by the children and used as a chewing gum.

And while Turkish women habitually make use of the one to preserve and whiten their teeth, strengthen their gums, and purify their breath, the Indian maiden, true to the instincts of woman's nature, uses the other to add these same attractions to those other personal charms she possesses in the eyes of some brave young warrior of the tribe.

As a preparation for filling the cavities of carious teeth, I think it will be found equal to mastic, as it is as tenacious and hard.

Dissolved in turpentine, it makes a most brilliant varnish, equalling, I think, the best specimens of mastic, and being even lighter colored than that favorite kind.

But it is as a masticatory that I am inclined to place the highest value upon it.

Though, as I stated in opening, I have not had the gum sufficiently long to experiment with, yet I have taken great pains to inquire of intelligent farmers who are familiar with it, into its effects upon the animals who feed upon the plant, and I find that it is much sought after by cattle, and is considered by all who have given the subject any attention, a sure cure for the heaves in horses.

Being assured of this fact, I was induced to press my inquiries more directly as to its effects upon the human system.

Having none of this gum, I substituted mastic, by chewing which, and swallowing the saliva, I found that any irritation of the lungs was often allayed, and coughing stopped. Reasoning from analogy, I am inclined to the opinion that this same effect will often be produced by the use of the prairie gum.

To corroborate this opinion, I have the direct testimony of but one person, that of the highly accomplished Miss Jennie Stevens, of Jefferson City, Mo.

In conversation with me upon the subject this fall, she stated that a few years since she was troubled with very weak lungs, so much in fact that the difficulty was a source of anxiety to her friends, and she herself was fearful that she would be compelled to relinquish her employment as teacher, for often at the close of a day she was scarcely able to articulate above a whisper. While in this condition, and living at the time where resin weed was plentiful, she by some means got to chewing the gum, and was surprised to observe the marked effect it immediately had upon her; for let her be as weary as she might, she always felt, after chewing the gum a short time, as much refreshed as though she had enjoyed hours of repose, while her lungs gradually became stronger, and by gathering enough gum in the fall to last for the season, and using it every evening, as above stated, when the duties of the day had ended, she eventually became perfectly cured, and has to-day as strong and healthy a pair of lungs as could be desired.

Miss Stevens added she was perfectly willing that I should make her case public, as she believes her cure resulted from the use of the gum, and she was happy to know that the subject was being investigated, and did not doubt were the virtue of this unpretending weed generally known, many valuable lives might be saved that now yield to the insidious and persevering demolutions of that fell destroyer, consumption.

I regret that I am unable to add more testimony in support of my opinion, but I hope by the next session of this body to be able to put you in possession of other facts.

For that purpose I have ordered the collection, in different sections of our State, of $25 worth of the gum, with which I intend to test its virtues.

3d. To what extent may it be collected as an article of commerce?

The luxuriant prairies of the west abound with this weed, where frequently thousands of acres of it stretch off before the eye, bearing in the fall, bright yellow flowers, which, as they nod to the wind, resemble an immense army waving its rich banners of gold.

It is this weed, in a great measure, that makes a prairie on fire so grand an object to contemplate.

In a good season, when the plant has attained the height of eight or ten feet, after the first frost has plucked, with vandal hands, the rich ornaments that crowd these broad aisles of God's noble temples, I would bid you gaze upon one of those extensive prairies, sweeping off to the horizon, broader and wider than whole kingdoms of Europe, as a fire is enkindled upon its border, if you would have your soul impressed with grandeur and admiration.

Then it is that the waves of flame roll in high columns over this terrestrial sea, lapping with fiery tongues the hardened juice from the stalks that the sun has called forth, throwing their red gauntlet of defiance high into heaven, midst the storm-brewing clouds, which may return the bold challenge with

hoarse rumblings and heavy showers as they ride there at anchor, frightening the beasts from their coverts, and the birds from their nests, and roaring like Niagara, as they go rushing along.

But as the hardy pioneer seeks these prairies for his home, they are carved with rail fences, and dissected by plows, and the rosin plant grows less rank as the scythe of the mower and the herd of the husbandmen cut it frequently! until finally, like the Indian maiden that once called its blossoms her sisters, which she vied with in beauty, it is lost altogether where it once did abound.

Whether it might not be cultivated, and thus be preserved, I am to determine this season by experiment.

But one great obstacle in the way of its becoming an article of commerce is the fact that it is tedious to collect, exuding as it does, in small tears, or masses, it can only be gathered at a great expense of time. By breaking the top off, or making incisions in the stalk, it might yield larger fragments, but until some other method is devised for procuring it, it will remain an expensive article.

Yet should it prove to be so valuable a remedy in bronchial affections as I now consider it, some suitable means will be adopted to render its general use within the means of all.

I have thus imperfectly introduced this subject, leaving it for others to go on investigating the broad fields that lie upon our western borders, inviting the study and inspection of man.

I am glad that the attention of this Society is turned in that direction, and I doubt not a careful investigation of the properties of those indigenous plants that have for so many ages proved oftentimes remedial in the unskilful hands of the aborigines, will, when examined and made use of by intelligent practitioners, be found very beneficial in curing those complaints peculiar to the locality in which they are found.

For it is my firm conviction the great Ordainer, who visited the primitive inhabitants of this country, with diseases peculiar to their particular climate and locality, also furnished them with remedial agents at hand, by giving them the keys to Nature's laboratory, and bidding them seek there their curatives, instead of compelling them, pagan-like, to turn eastward to worship the healing god, and, like us, rely mainly upon

"The poison drugs from India come,"

for relief from their complaints.

And while we, as Americans, favor domestic products, and home industry, let us also seek here our medicines.

Nor will we seek in vain, for we will find in our own country, growing out of our own diversified soil, all those remedies that the exigencies of life shall demand.

EDWIN O. GALE,
202 Randolph Street.

Chicago, September 2d, 1859.

LIQUOR FERRI IODIDI.

BY W. J. M. GORDON, CINCINNATI.

At a meeting of the American Pharmaceutical Association, held at Washington, Sept., 1858, I accepted the following subject for investigation: —

"It has been found that Liquor Ferri Iodidi of the Pharmacopœia frequently assumes a brown color, and that this color is entirely dissipated on exposure to light, or may be prevented entirely by such exposure to light when first made.

"*Question* — To what is this change due, and is it, by such change, therapeutically affected?"

Newly prepared Syrup of Iodide of Iron, according to the United States Pharmacopœia, is a transparent liquor of a pale-green color, but frequently becomes a dark red. If exposed to the direct light of the sun, it is restored to its original transparency and color. The same change will take place if exposed to the indirect light, but requires a much longer time. The loss of color by the action of light distinguishes the syrup from a watery solution of the iodide of iron, which, if exposed to light, undergoes continual decomposition, becoming darker and darker. The inference is very clear, that the deoxydizing influence of the sugar, which if so well known, protracts the decomposition; but the darkening of the syrup continues if the light is excluded, and to the light must be attributed a great influence on the changes going on in the syrup. To ascertain what these changes are, the following experiments have been made: —

1. A dark syrup was filtered; the filtered liquid was clear, of a reddish-brown color, and contained free iodine, as a test with starch clearly showed. On the filter remained a deposit, which, after being well washed, dried, and heated, smelled strongly of iodine, and left oxide of iron. The solution of this deposit in nitric acid, after an addition of starch, became blue.

2. Some of the dark syrup was exposed to the direct light of the sun, filtered after it had assumed a light-green color, and the well-washed deposit on the filter was found to be oxide of iron, entirely free from iodine, and in the syrup there was no longer any free iodine, as a test of starch showed.

3. Fifteen grains of iodide of iron and one ounce of water were put in two white bottles; these were exposed to the sunlight; in both of them the liquid soon became turbid, and assumed a red color, caused by free iodine. To one of the bottles was then added a small quantity of sugar, and its contents became almost immediately nearly colorless and clear, depositing sediment of oxide of iron, while the liquid in the other bottle was constantly becoming darker, and seemed to be entirely decomposed.

From these experiments, the following conclusions have been arrived at. In the dark syrup a combination of iodide of iron is suspended, and free iodine dissolved in it. In the syrup decolorized by the light there is no longer

any free iodine dissolved in it, but it contains a sediment of oxide of iron. The sediment in a watery solution of iodide of iron, according to Berzelius, is an oxyiodide of iron, probably $Fe_2 I_3 + Fe_2 O_3$. The following will explain this. 4 Fe, I and 3 O, form in the dark $Fe_2 I_3 + Fe_2 O_3$ and I.

As experiment No. 2 shows, the oxyiodide is decomposed by exposure to the light, the sediment no longer contains any iodine, and the proto-iodide of iron again formed $Fe_2 I_3 +$ and $Fe_2 O_3$ and 2 I. But this iodine, which, according to the formula, is free, can no longer be tested by starch, and the principal purpose of this examination was to ascertain what had become of it. The most simple explanation is, that hydriodic acid had been formed. To test for the hydriodic acid, about one pound of the decolorized syrup was put in a glass retort, and heat applied until half an ounce was distilled over. This liquid was found to be a watery solution of hydroidic acid. Nitrate of silver produced a yellow precipitate of iodide of silver, and starch became blue upon the addition of chlorine water.

A solution of iodine in sugar and water, in which iodine is more soluble than in water, has a dark-red color; sun light changes it to white, and no free iodine can be found in the decolorized liquid, and all reactions show that the iodine is changed into hydriodic acid. The same change takes place in an alcoholic solution of iodine, and in a watery solution of iodine in iodide of potassium. The process given above is a very easy and simple one for testing syrup of iodide of iron for hydriodic acid. How far the medical properties of the syrup are affected can only be determined by the careful observation of physicians; but it is obvious that a dark syrup should never be used, in consequence of its containing free iodine.

A SYNOPSIS OF THE HISTORY OF PHARMACY AND ITS PROGRESS AS A SCIENCE, FROM THE EARLIEST PERIOD TO THE PRESENT TIME.

BY JAMES O'GALLAGHER, OF ST. LOUIS, MO.

Pharmacy, considered in its primitive signification, is an art whose objects were the choice and preparation of the most simple remedies capable of relieving the sufferings to which man is heir. No people has been found, no matter how barbarous, who were not acquainted with this art. Mankind in a rude state of society, be their occupation the hunting of wild beasts or the agriculture of the earth, have constantly under their observation the vegetable kingdom and its wide field which Nature spreads before them, from which they can select remedies to heal their wounds or cure their diseases. The knowledge of vegetables, their selection, and the simple manipulation required before applying them to allay suffering, were known to every peo-

ple, were born, as it were, with their first wants, and advanced with the revolutions and progress of the human mind. In following the history of this progress, we arrive at an epoch, when, by the union of a multitude of facts before isolated and divided, a distinct science is necessarily brought to light. The division of all bodies into three classes, as most adapted to the universal plan of nature, is indicated in the most ancient books and first annals of the world. The philosophers of former days, the naturalists of modern times have agreed to this division. Those who follow us will be obliged to conform to the same, as one of those truths which time cannot change, and which future centuries will still acknowledge as the best. In the language of the celebrated Linne, "Mineralia crescunt, Vegetabilia crescunt et vivunt, Animalia crescunt vivunt et sentiunt."

Vegetables were first used as medicines. The mode of preparing them was simple. The offices of doctor and apothecary were united in the same individual, who was much respected. According to Herodotus and Strabo, it was a general custom among the Babylonians to expose their sick persons to the view of the passers, so as to learn from them if they had been afflicted by similar diseases, and ascertain by what remedies they had been cured. Pliny tells us that the art of physic, founded by Esculapius during the Trojan war, was buried in darkness during the Peloponnesian war, when Hippocrates restored it to its former honor and credit. Virgil, in speaking of a celebrated physician who was instructed by Apollo in the art of physic, confines the profession to the knowledge of simples. "Scire potestates herbarum usumque medendi molent." The art of pharmacy must have flourished in Egypt, which for so many centuries was the great emporium of the East; but to what extent we cannot justly say. The study of medicines was surrounded with so many regulations that the progress must have been slow. The priests from the temples of the gods dispensed their favors in a mysterious manner to the untutored. Among the Jews the apothecary possessed considerable influence; but we know little of the details of his practice. The most reliable accounts we have of the art of physic being practised by a distinct class of men are from the East. In the temples of Esculapius men were trained to practise medicine and pharmacy. Among the priests a stock of knowledge was preserved, and transmitted to their successors. It was customary for persons cured by the prescriptions of the priests to hang up in the temples tablets on which were written the names of the disease and the remedies by which it had been cured. This was one of the usual methods of preserving the knowledge of the Materia Medica. Hippocrates, whom history has handed down to us as a celebrated practitioner, was educated by the priests of Esculapius. His first work, called "De Herbis," was written 459 years before the Christian era. In it he mentions the properties of 234 medicinal plants. His Materia Medica was vegetable; his treatment confined to the use of simples and general hygienic ordinances. Hippocrates was an apothecary as well as physician, and can be claimed with as much right

as the founder of systematic pharmacy as the father of physic. After the age of Hippocrates, we have the writings of some Greek physicians to enlighten us on the progress of pharmacy. We can mention Aristotle, Theophrastus, Erasistratus, Herophilus, his disciple, Philinus of Cas; also Seraphion of Alexandria.

Under the teachings of the dogmatic school of Alexandria, pharmacy was held in high repute. Those who sold medicines were divided into several classes. The pharmacutæ resembled the pharmaceutists of the present day; kept stores and dispensed medicines. The seplasiarii were druggists; sold perfumes as well as drugs. The herbarii and rhizotomi sold herbs and roots. The empirical school arose after the time of Herophilus. Philinus or Seraphion was the founder. If the favor and contributions of the great could have helped this new sect, they were not wanting, since we know that generals, kings, queens, and princes claimed alliance with the empirics, giving their names to compounds which were reputed to perform wonderful cures.

When the Romans became masters of the world, and Greece a Roman province, Greek physicians and pharmaceutists settled at Rome. Among them, and not the Romans, can we find much taste for medical science. Asclepiades, a Greek, became an eminent practitioner in the proud city of the Cæsars. He used but few medicines; contributed but little towards the progress of pharmacy. His theory, no doubt, gave rise to the methodical school, of which Themison of Laodicea was soon after the founder. Cato the Censor was the first Roman who wrote on medicine; then Cornelius Celsus, also a native of Italy. Scriboneus Largus is the next writer on Materia Medica. His nomenclature, like that of Celsus, is very uncertain. They both studied poisons and their antidotes; but arrived at no clear perception of either. Poisons and their antidotes had been commented upon long before this by Nicander of Colophon. He is the author of the "Theriaca" and "De Alexipharmacis." Quack medicines, after this period, were reputed by many as the only true remedies. The quacks, then as now, found dupes among the ignorant and credulous. The mania of composition was carried to its height by Andromachus, senior, the author of the "Theriaca Andromachi," which enjoyed until the middle of the last century such a high repute. Dioscorides, living in the reign of the emperor Vespasian, wrote a work on botany. Many of his opinions are erroneous. Almost contemporary with Dioscorides lived the elder Pliny. He did much for Materia Medica, and protested against the compositions then in vogue. In speaking of the famous "Mithridaticum Antidoton" he says: "Quo deorum perfidiam istam monstrante? Hominum enim subtilitas tanta esse non potuit ostentatio artis et portentosa scientiæ renditatis manifesta est."

Soon after Pliny, lived the celebrated Galen, a native of Pergamus in Asia Minor. After studying at the most celebrated schools, he settled at Rome, and became the founder of a system of pharmacy and practice of medicine which was followed in Asia, Africa, and Europe for fourteen centuries. The

doctrines promulgated by Galen were many of them similar to those of Hippocrates. In trying to divert the Hippocratic school from the absurdities which surrounded it, he believed in doctrines equally ridiculous. Galen arranged in scientific order the uncertain medical information of his predecessors, meriting by his perseverance and talents to be the chief of the system which still bears his name.

After Galen, no particular change in the practice of pharmacy occurred among the Greeks or Romans. Actius, Oribasius, and others wrote works on Materia Medica. They may, however, be called compilations from the books of Galen. After the destruction of the Roman empire, we find pharmacy declined among the Greeks, and transplanted among the Arabians, no doubt by Greeks whom persecution or devastation had forced to seek refuge either in Asia or Africa. From the Arabian schools, physicians and pharmaceutists were sent to revive the study of pharmacy and practice of medicine in western Europe, after centuries of total ignorance. Still it was the Galenical system, with some modifications and additions to the Materia Medica.

Among our own ancestors, barbarous, uncultivated as they are generally supposed to have been, we find there existed a considerable knowledge of the healing art. By our ancestors, I mean the Celti, the Cimbri, the Galli, the Germani, &c., &c. In the poem of Oithona, we read of a chief who had been a diligent student of Esculapius. "Can the hand of Gaul heal thee?" he asks; "I have searched for the herbs of the mountains; I have gathered them on the secret banks of their streams; my hand has closed the wound of the brave." Fingal is celebrated for his *Cuach fhinn*, or medical cup, in Celtic tradition. Cæsar, in his "Bello Gallico," tells us the Druids were physicians as well as ministers of religion. Pliny mentions the Celts of Spain as expert in knowing the medicinal virtues of herbs growing in that country. The Gauls and their neighbors, no doubt, believed that the potency of herbs was gained by mysterious ceremonies. Their physicians, the Druids, encouraged this belief; wonderful cures were supposed to be made; strength also to resist pain obtained by the application of certain herbs. "Where," says Pliny, "were those potent herbs among the Cimbri, when they were so completely routed that they yelled again?" The prescriptions were chiefly confined to preparations made of herbs. The inhabitants of the isles and sea-coasts mixed sea weeds with the herbs. In adding up the different simples used, we find they amount to about fifty; among which are, the betony, the cochlaria, the golden rod, the hellebore, the plaintain, the spirewort, and the vervaine. In applying these simples, superstitious ceremonies were performed, in the efficacy of which the people believed; but we should overlook this in the customs of our so-called savage, untutored sires, when we recollect that Socrates, dying, told his friend Crito to sacrifice a cock to Esculapius; that Galen worshipped Esculapius as a god; and, more recently, that the last of the Tudors of England received from Sir Christopher Hatton a ring to protect her from the plague. We may add the history of the well-attested cure of Lady Baird, of

Sauchtenhall, near Edinburgh, by the Lee penny, which was also borrowed by the town of Newcastle, to protect it from the plague.

In different parts of Europe are preserved Arabic, Greek, and Latin medical manuscripts. The libraries of France, Germany, and Italy contain a varied, valuable number. The public library of Bodley, at Oxford, and that of Baron Thomas Philipps, in Worcestershire, are worthy of note. The libraries of Emmanuel, Trinity, Pembroke, Corpus Christi, Saint John, Saint Peter, and the University of Cambridge, contain many valuable Greek and Latin manuscripts. Some Greek manuscripts are more numerous than others. The works of Galen, for instance, copied from Oribasius, are frequently found, as well as copies of the receipts and formularies of Galen and Dioscorides. In England the Latin manuscripts are numerous. Among those of the seventh, eighth, and ninth centuries are the Antidotarii of Micalaus, Aurelius, Gariopontus, Theodorus, Priscianus, some traductions of Hippocrates and Galen, as well as Oribasius. In many libraries are translations of the Arabian and Greek authors. In the fifteenth century, when medicine began to divide itself into several systems, the foreign manuscripts are replaced by those of authors, natives of the countries in which they are still preserved. Among the most ancient pharmaceutical formularies still extant, are copies of the formularies of Stephen of Athens, and those of John of Alexandria.

The history of ancient medical manuscripts affords a wide field for instruction. At some future time we may be able to dwell more on this subject.

In this synopsis, we have arrived at the time when Galenical pharmacy began to decline, to give place to a more potent system of practice. The history of pharmacy, up to the sixteenth century, may be divided into two periods, — the days of Hippocrates and his successors, and those of Galen and his disciples.

In the beginning of the sixteenth century, chemistry produced a complete revolution in the European practice of pharmacy. Its progress had been slow; but its ultimate triumph over the theories of the Galenical school, was only a question of time. We find it grappling with the reputed infallible doctrines of the day, and finally overcome them.

Let us examine the interesting history of this science.

About the third or fourth century of the Christian era, arose a singular bewitching art, the principal object of which was the transmutation of metals, or the making of gold and silver by artificial means. This art, called alchemistry, or hermetic art, was practised in Greece and Egypt about the same time. The fourth century saw its rise; the seventh, its downfall, after having spread itself over the civilized world. The transmutation of metals into gold and silver was to be accomplished by the agency of a certain substance, called the philosopher's stone or powder, which was said also to cure diseases and prolong human life. The alchemists were, we must acknowledge, the first inventors of an experimental rule, having for object the solution of a scientific problem. By uniting a number of facts and discoveries appertaining to

bodies, proving phenomena by the examination of facts, they necessarily laid the foundat on of the science of chemistry, to which pharmacy owes the high position it now holds. The alchemists sought what they did not find, — the "philosopher's stone;" they found what they did not seek for, — "chemistry," a more precious pearl for the world than the *ignis fatua* they so passionately pursued, and in vain expected. Among those who professed alchemistry were, no doubt, men whose ignorance brought contempt on the works of the true alchemists. Alchemistry was practised by a member of every family of respectability. In the fifteenth and sixteenth centuries, investigations of this art were pursued even in the cabins of the poor. Franz Gassman says, in his "*Examen Alchemisticum*," —

> "Presque tout le monde vent être appelé alchimiste,
> Un grossier idiot, le garçon et le vieillard,
> Le barbier, la vieille femme, un conseiller fecétieng,
> Le moine tonder, le prêtre et le soldat."

Geber, an Arab of the eighth century, may be called the father of chemistry. In his works called the "Sum of Perfection," and "Treatise on Furnaces," he gives descriptions of the operations he used in chemical investigations, which differ little from those of the present day. To the alchemists, we must confess, belongs the honor of the first chemical experiments. They prepared the elements necessary for, and may be justly named the founders of, modern chemistry. Geber, in his writings, describes mercury, silver, lead, brass, gold, sulphur, and arsenic. In his "Treatice de Alchimia" he tells how to make *aqua fortis* and *aqua regia*. Mention first is made by him of several chemical compounds constantly dispensed by pharmaceutists, — *lapis infernalis*, corrosive sublimate, red precipitate, liver of sulphur, milk of sulphur, &c., &c. In the ninth century, Rhases, another Arab, discovered the preparation of brandy. He recommends several pharmaceutical preparations, of which alcohol is the vehicle. He mentions borax, some combinations of sulphur, salts of mercury, &c., &c. The Materia Medica of Aben-Guefith and the *Hawi* of Rhases, show that pharmacy and the practice of medicine could at this remote period be greatly improved by the discoveries of the alchemists. In the thirteenth century, Albert the Great made caustic potassa.

Raymond Lulle wrote an excellent work, called, "Ars Magna;" made first carbonate of potassa, rectified spirits of wine, prepared essential oils, and prepared mild mercury, *hydrargyrum mite*. Basil Valentine, a German alchemist, wrote a work called, "Currus Triomphalis Antimonii," in which he describes the properties of antimony, spirits of salts, or *acidum hydrochloricum*. He made first sulphuric acid, and was a close observer of the different phenomena occurring during his chemical experiments. The alchemists knew how to make some of the most active chemical compounds of the present day. They volatilized mercury, concentrated alcohol, made sulphuric ether, nitric

acid, different kinds of ethers. Eck of Sulybach, a German alchemist in the fifteenth century, believed in the existence of oxigene. Van Helmont proved that there were different gases. Brandt discovered phosphorus.

Attempts were made by some practitioners to introduce chemical compounds into the practice of medicine, but with little success. From the words of Gordonius, a writer of the fifteenth century, author of the "Lilium Medecinæ," we can judge of the prevailing opinion. "Quia," says Gordonius, "modus chimicus in multis utilis est, sed in aliis est tristabilis quod in ejus via infinitissimi perierunt."

To Paracelsus, a native of Switzerland, belongs the honor of successfully introducing chemical compounds into the European practice of medicine. Pharmaceutist, as well as physician, he directed the discoveries of chemistry to the renovation of pharmacy and improvement of the Materia Medica. By his indomitable energy and perseverance and confidence in his own theories, he levelled the first great blow at Galenical pharmacy. Treating the practitioners of the old school with contempt, he cured, with his chemical compounds, the diseases which baffled their skill. The Galenical system is shaken to its very foundation, and soon crumbles to pieces under the attacks of his disciples. For a hundred years after the death of Paracelsus, a continual war was waged between the disciples of Paracelsus, called chemists, and the Galenists. Pharmacy advanced slowly. Geoffroy and the two Lemerys are worthy of our notice. Geoffroy became noted as a manufacturer of pharmaceutical preparations. He is the author of the first "Paris Pharmacopœia." The Lemerys gave public lectures on chemistry, Materia Medica, and pharmacy. Schraeder published a work called "Pharmacopœia Medico Chymica," in which he united the Galenical and chemical pharmacy. Bauchin wrote on the nature of plants used in pharmacy; then Chomel, Lieutand, and others. Among the British authors are Dr. Lewis, and Dr. Rutty, of Dublin. The latter is the author of the "Materia Medica Antiqua et Nova."

We will not stop to notice in detail the pharmacy of the sixteenth and seventeeth centuries. It will not repay our time. It was only when Priestly, Lavoisier, and Cavendish investigated the gases, and showed the compound nature of air and water; after Guyton, Morveau, Lavoisier, Berthollet, and Fourcroy laid down the true chart of modern chemistry, gave a new constitution to the science, in reforming the nomenclature; not until after the discoveries of Berzelius, Davy, Gay, Lussac, Thenard, Liebeg, and Dumas that chemistry became a real science, and pharmacy, the handmaid of chemistry, could take the honorable position it now holds in the civilized world.

In China, Persia, and Turkey, the Galenical pharmacy still predominates. We know little of Japanese pharmacy. We cannot, however, believe the statement of a recent traveller and historian, who says that the Japanese are deficient in the knowledge of medicine and surgery.

In America and Europe pharmacy is in a flourishing condition. The empiric school of medicine, however, is found in both countries, in spite of all the progress we have made. So it will always be, as long as men will prostitute their calling, as long as the sole desire to make money prevails, at the expense of a noble profession and conscience.

To the colleges of pharmacy and pharmaceutical associations belongs the privilege of discarding from being members of the profession, ignorant men. Already much has been done by the different colleges and associations in this country for the advancement of pharmacy. They have shown, also, that the profession of pharmaceutist in America can compare favorably with that of any other country, and that we are in no respect inferior to any other profession.

REMARKS ON POLYGALIC ACID.

BY WILLIAM PROCTER, JR.

Among the questions proposed last year for investigation, the following was accepted by me:—

"What is the most eligible process for obtaining Polygalic acid from Senega? In what proportion does it exist in that root? And what are the forms for prescribing it as substitutes for the preparations of seneka?"

Seneka snake root, as one of the most efficient American contributions to the Materia Medica, early attracted the attention of European pharmaceutists and chemists, and at least half a dozen analyses of it had been published more than twenty years ago, when it was very fully investigated by Quevenne, (Jour. de Pharm., 1836, 449) in his inaugural essay sustained at the School of Pharmacy, at Paris.

According to this analysis the constituents of seneka are as follows, viz.:—

ORGANIC.	INORGANIC.
Polygalic acid,	Carbonate Phosphate and Sulphate of Potassa,
Virgineic acid,	Chloride of Potassium,
Pectic acid,	Carbonate, Sulphate, and Phosphate of Lime,
Tannic acid,	Alumina, Magnesia, Silica, and Iron.
Bitter yellow coloring matter,	
Gum, Albumen, &c.,	
Cerin, and fixed oil.	

Polygalic acid, so called by Quevenne, was previously made known in a less pure state, as *senegin*, by Gehlin. It is the active constituent of the root, although some influence may be due to the virgineic acid and coloring principle. It may also be noticed that both Dulong and Foenuille found malic acid in this root, united with lime and potassa.

It may not be out of place to state the characteristics of this substance, as it

is certainly deserving of a better destiny than has thus far been accorded to it. Polygalic acid is a white amorphous powder, without any tendency to crystallize, and is unalterable in the air. It is inodorous when pure, but is apt to retain traces of virgineic acids. Its taste, at first but slight, soon becomes pungent and acrid, and produces a painful constriction of the throat. When its dust is inhaled through the nostrils, irritation and violent sneezing occur. It is not volatile; when burnt in a tube it affords no nitrogen, and is wholly combustible. Polygalic dissolves slowly in cold water, but readily in hot water, forming a solution which reddens litmus paper, and froths strongly by agitation. It is soluble in boiling alcohol, but the larger part separates on cooling. It is soluble in diluted alcohol, but the solution has a tendency to deposit it on standing. It is absolutely insoluble in ether, and in acetic ether, the fixed and volatile oils. It is soluble in alkaline solutions, with the production of a greenish yellow coloration. It is precipitated in its free state by subacetate of lead, and proto nitrate of mercury, but by no other salts; various salts throw it down from solution when it is combined with an excess of potassa or soda. When heated with nitric acid it affords oxalic and pieric acids, and sulphuric acid decomposes it with a rose and violet color. The acid character of this substance is so slight that it will not decompose the carbonate, yet it forms amorphous salts with alkaline and metallic bases. Quevenne suspected a close relationship between polygalic acid and saponin. More recently (Annl. der Chemie. and Amer. Jour. Pharm., vol. xxvii., 43) M. Bolley has resumed the inquiry, and believes that both saponin and polygalic acid are glucosides, like salicin resolved by hydrochloric acid, into sugar and a derivative body *sapogenin*, and that their formula is the same.

Preparation of Polygalic Acid. The particular object of this paper is the preparation and administration of this substance. The original process of Quevenne required precipitation by acetate of lead, and the action of sulphuretted hydrogen; but he afterwards greatly simplified the process, but retained some complications not necessary to obtain the acid sufficiently pure for medicinal use. The process I have tried several times, and has the merit of great simplicity.

Take of senega, in powder, (50 meshes to the inch) 10000 grs.
Alcohol,
Ether and water, of each a sufficient quantity.

Moisten the senega with half a pint of a mixture of two parts of alcohol and one part of water, pack it in a large glass funnel; cover the surface with a piece of muslin, or paper, and pour on the same liquid until three pints have slowly passed by drops, or until the root is nearly exhausted. Evaporate this tincture to twelve fluid ounces, which removes nearly the whole of the alcohol, and then agitate it with repeated portions of ether, until the latter ceases to acquire color, decanting each portion before adding the next, which requires about a pint and a half. The syrupy liquid is now mixed with a pint and a

half of strong alcohol, and half a pint of ether, well agitated several times and set aside to repose. The polygalic acid being nearly insoluble in this menstruum, precipitates as a bulky light fawn-colored precipitate. If on adding a small portion of the clear liquid to a similar mixture of ether and alcohol, no precipitate occurs; the whole of the polygalic acid capable of being thus thrown down has been separated. The supernatant liquid is now carefully decanted from the precipitate, which is thrown on to a filter and carefully washedwith a mixture of two parts of alcohol and one of ether, till the adhering colored liquid has all been displaced. The filter is then spread on an absorbent surface of paper, pressed strongly, the mass broken into small fragments, dried, and powdered. The resulting powder weighs 550 grains; 5½ per cent. of the weight of the senega, making allowance for wastage senega, may be said to contain one-sixteenth of its weight of this substance, and consequently three grains will equal an ounce of the root.

In this state polygalic acid is not pure, but is sufficiently so for all medical purposes. It retains traces of coloring matter, and of some substances which are separated by the ether, but in very small amount. By re-dissolving it in hot water, and precipitating with the mixture of ether and alcohol, and afterwards dissolving it in hot alcohol, with animal charcoal, and filtering hot, it is obtained quite white.

The ethereal working liquids first obtained were evaporated till no ether remained. The residue consisted of a dark amber-colored fixed oil, admixed with crystals of virgineic acid, which formed a crust on its surface, and a dense aqueous solution of the same acid, which strongly affected litmus paper.

The liquid from which the polygalic acid precipitated was allowed to stand a month, when the sides and bottom of the vessel were spangled with a cystalline matter, in small quantity. This substance is soluble in water, when heated; less soluble in alcohol; gritty between the teeth; has no taste of senega; fuses by heat; blackens and is almost entirely consumed. Concentrated SO^3 dissolves them with heat without the evolution of either ammonia or H. Cl. Its aqueous solution is not precipitated by either chloride of barium or nitrate of silver. A crystal placed on moistened litmus paper produced a reddish spot. It is possible that this substance is an acid salt of malic or some analogous acid. The small quantity of ash it leaves is alkaline. The investigation was not pushed further.

The liquid, from which the crystal deposited by evaporation, yielded an extract tasting strongly of senega.

As regards the pharmaceutical applications of polygalic acid, several experiments were made:—

1. Five grains of the acid in a fluid ounce of water, kept in a vial for two months, acquired a fœtid odor, whilst a portion of matter precipitated, yet the taste of the solution was strongly that of senega.

2. Five grains of the acid were dissolved in an ounce of cold water, with five

grains of bi-carbonate of potassa, and kept the same length of time. This solution also spoiled, but retained its senega taste.

The best form of prescribing polygalic acid, in liquid form, is with syrup of gum arabic, to blunt its acrimony. It is necessary to dissolve it in a little hot water, and add it warm to the syrup of gum, and mix them. It may also be added to syrup of ipecacuanha to increase its expectorant power. But the form best adapted to administer this principle is in pills and powders. In doses of one or two grains (which represent 15 to 30 grains of senega) the full effect of a table spoonful and a fluid ounce of decoction of senega is obtained. Where a more gentle effect is desired, the dose must of course be greatly reduced, to $\frac{1}{2}$ or $\frac{1}{4}$ of a grain, and can be associated with ipecac, tartar emetic, and other medicine with which senega is given. When the form of powders is adopted, a mixture of powder gum and sugar should always be added to blunt the acrimony of the polygalic acid. Sugar of milk triturated with the acid, in the proportion of 1 grain to 9 grains, is an eligible form for use.

In cough mixtures, when not contra-indicated or incompatible, the addition of an equal weight of bi-carbonate of potassa facilitates its solution. It is not advisable to keep a permanent liquid preparation of polygalic acid, leaving that form for the officinal syrup, but it undoubtedly offers an admirable means of using senega in the forms above indicated, when the physician can regulate the dose and associate it with other remedies in the nicest manner.

SORGHUM SACCHARATUM.

In answer to the Query No. 33, the following report is respectfully submitted.

The seed of the Sorghum Saccharatum was introduced into our country, probably, for the first time, in the fall of the year, 1854, by a Boston house, and distributed in small parcels to various parts of the Union. During the winter and spring following, other seed, to a limited amount, were disseminated from the agricultural department of the Patent Office. Experiments were made in its culture upon a very small scale, by myself and a few others in Georgia during the year 1855, and it was observed that the growth was healthly and vigorous, that it required no nursing or extra care, that the cultivation was easy and simple, that the seed matured perfectly, and lastly, that the pith of the stalks was firm, crispy, and brittle, and remarkably sweet and sugary to the taste.

During the month of Septemder, 1855, from the few immature canes at my disposal, I expressed a small quantity, say 20 ounces, of pale green juice, and without any attempt at defecation, boiled it rapidly down to four ounces of rather thick syrup, to render it more portable, and avoid for a time fermentation. When examined a few months subsequently it was found to have deposited a granular matter, occupying, say one-fifth of its bulk, which deposit was supposed from its appearance to contain sugar. The two portions were

separated, the syrup diluted with water, precipitated by basic acetate lead, afterwards by H S, and evaporated under the air pump, with occasional use of moderate heat, to a granular and nearly dry saccharine mass weighing 880.5 grains.

The deposited portion was treated with a mixture of alcohol and ether equal parts, and the resulting solution, evaporated to dryness, left globules of chlorophyl and a resinous body of decided acid and bitter taste. The residue was dissolved in water, filtered, passed through bone black, treated with basic acetate and sulphuretted hydrogen evaporated to dryness, and yielded 127 grains saccharine matter.

The two products were re-dissolved, filtered, and evaporated, yielding a fair sample of brown sugar in small crystals, and the drip, by long standing, deposited a few crystals of such size and definite shape as to require only the eye to determine them to be true cane sugar.

My samples were exhibited at one of the pharmaceutical meetings of the Philadelphia College, and sent home that my friends might examine them, and prepare for a more satisfactory experiment the ensuing season. During the year 1856, in Georgia, perhaps ten acres were planted, while seed in larger quantity had been sent out from the Patent Office, and cultivated in gardens in probably every State in the Union. In August of that year, Ex-Gov. Hammond, of South Carolina, reported to the Beech Island Farmers' Club, the first successful experiment in the manufacture of syrup, from a patch of a half acre. In September, Mr. Peters, of Atlanta, Georgia, published the results of experiments upon a still larger scale, and from more mature cane. He kept careful notes of the yield from two measured patches, one-eighth of an acre each, the best and worst samples of the crop, and reported from the former:

3315 canes yielded juice, s. g. 1.085, ...	253 gallons.
yielded syrup, s. g. 1.335, ...	58½ "
Estimated per acre, ...	468 "
From the poorest:	
2550 canes, yielded juice, s. g. 1.085, . . .	179 gallons.
yielded syrup, s. g. 1.335, ...	43½ "
Estimated per acre, ...	346 "

A rough experiment was made for the manufacture of sugar, from 20 gallons of syrup, boiled down in a cow-pot over an open fire and tested by the eye. The result was a thick magma of finely granulated sugar and molasses, which refused to purge itself by dripping.

Thirty of the stalks were weighed, crushed, and dried in the sun, with the following result:

Juice collected from mill, ...	$26\frac{1}{16}$ or 49.30 per cent.
Juice lost in mill, ...	$\frac{6}{16}$ or .70 " "
Juice lost in bagass, ...	$17\frac{14}{16}$ or 34.50 " "
Moody fibre, &c., ...	$8\frac{8}{16}$ or 15.50 " "

The syrup made by Mr. Peters was excellent, and, by all who tested its table qualities, pronounced superior to the best sold here as New Orleans syrup.

This successful experiment in syrup-making created some enthusiasm among our farmers in this and adjoining States, and indeed to a greater or less extent throughout the whole country. The seed was in much request and eagerly bought up, large importations were made from abroad, and the culture for the year 1857 greatly extended. During this year there were perhaps between four and five thousand farmers supplied with seed from the State of Georgia alone. In my own county over one hundred acres were grown and probably from two to three hundred acres in a county adjoining. So widespread has the culture become all over the land, it is impossible for me to offer even an approximate estimate. The manufacture of syrup from the juice has become very general, and this of almost every conceivable quality, some of it of very delicate and superior flavor, much that may be pronounced good, very much that is decidedly bad and even worthless. So great has been the variation in quality, and also in the relative quantity of the syrup produced by different parties in the same locality, that it has been difficult to come to any positive conclusion as to the value of the plant for this use, nor has it been altogether possible to ascertain fully the causes for the wide discrepancy exhibited in the results.

It is evident that few, comparatively, of those who have boiled the juice are well informed of the principles involved in the process, while nearly all are entirely destitute of any practical experience in the treatment of saccharine juices. The apparatus in use is generally of a primitive and quite defective character, unsuitable for securing the best results.

Aside from the obstacles encountered in the manufacture, there is as yet no well known standard of maturity of the cane; much of it has been cut too early, some is left too late. In the former case, an excess of both water and vegetable refuse is encountered, and in the latter a loss both in juice and sugar. It has been found that those external marks in the stalk and seed which indicate the culminating point here will not answer for the North, nor is it believed that this point is always a constant quantity in the same locality with different seasons and treatment of the plant.

The quantity grown upon the soil is also of importance; if it be too much crowded, the juice is poor; and if too thin, a loss is made in the quantity of saccharine matter; so also is a difference observed if the plants be "suckered"* or not. Variety in soils is found to affect the composition as well as quantity of juice very materially; different seasons, as to quantity of rain, influence the crop in a marked degree.

An effort has been made to determine some of the practical points connected with this enterprise; with a view of solving the problem of the extensive manufacture of sugar and syrup from the sorghum in this country. Although some doubt was at first entertained whether the sorghum grown in the Northern

* The removal of the small shoots, or suckers.

States yielded cane sugar, in consequence of the unsuccessful search at first made by a chemist of Boston, (I believe Dr. Jackson,) no such doubt has existed as regards its production at the South. It was extracted upon an experimental scale by myself from the few canes grown in 1855, and again upon a larger scale in 1856, and also in 1857. Further experiments in Massachusetts, New York, Illinois, Pennsylvania, and elsewhere, have fully and definitely settled the question for the North also.

The quantity of saccharine matter obtained by different experimenters has, of course, varied widely with the varying circumstances of climate, season, soil, culture, stage of maturity, &c. From my own immature juice in 1855, I obtained 10½ per cent. of crude saccharine matter. Dr. Jackson examined, the following year, samples grown in Massachusetts, and also in Washington. The former yielded from 10½ to 14½ per cent. The latter from 9 to 14½. In 1857, the same experimenter obtained from Massachusetts samples 9½ to 10½ per cent., and from Washington samples 12½ to 16½ per cent. M. Vilmorin, of Paris, reports as the result of his experiments upon a juice of S. G. 1.052 from 10 to 16 per cent., and M. Avequin, of New Orleans, from juice of S. G. 1.064 — 15½ per cent. The summer of 1856, in my particular section, was remarkably favorable for the growth and maturity of the cane. I did not determine the relative quantity of saccharine matter, but the S. G. (1.085,) was higher than any obtained before or since, while the relative quantity and quality of the syrup made indicated a larger percentage of cane sugar. There is reason to believe that under favorable circumstances, the saccharine percentage of the juice may reach 18 to 20, of which but two or three per cent. shall be of the uncrystallizable variety.

During the fall of 1857, daily observations of the specific gravity and percentage of crystallizable or cane sugar of the sorgho juice, were made, with the view of determining the proper stage of maturity for harvesting the crop. The observations were taken with a hydrometer of pretty good accuracy and the polarization apparatus of Mistcherlich.

Date.	S. G. of juice.	Per cent. cane sugar.
Sept. 24, 25, and 26,	1.055	
Sept. 28,	1.050	10.71
Sept. 28, (different soil,)	1.055	9.38
Sept. 29,	1.060	11.04
Sept. 29, (different soil,)	1.060	6.37
Sept. 30,	1.055	10.24
Oct. 1,	1.065	11.83
Oct. 2,	1.060	9.85
Oct. 3,	1.060	10.19
Oct. 10,	1.053	10.26
Oct. 18,	1.060	5.94

On the 30th of Sept., three mature canes were examined; they were large and more mature than the average working stock, the seed being quite

hard and brittle. The juice gave a S. G. 1.065, and contained 12.68 of crystallizable sugar. A sample from another part of the same field, and which had not been suckered in the previous culture, gave a S. G. 1.045, and had only 4.51 of cystallizable sugar.

Oct. 1st, a lot of fully matured canes of prime quality were examined and the several joints pressed separately:

1st joint, (from the ground,)	12.30 per cent.
2d joint, ...	11.89 " "
3d joint, ...	10.83 " "
4th joint, ...	11.04 " "
5th joint, ...	9.34 " "
6th joint, ...	9.98 " "
7th joint, ...	8.70 " "

The sugar is first developed in the upper joints and gradually appears below, until the upper portions pass the culminating point before the lower ones reach it.

Another sample, in which the seed had just passed the milk stage and cut soft and doughy under the knife, yielded 12.72 from the entire juice. Another, with the seed beginning to harden and cut cheesy under the knife, gave 11.89. A sample in which the cutting of the seed reminded one of cheese rind had 7.75 per cent. Another had matured the seed fully, the stalk and blade were turning quite yellow, had S. G. 1.060, and gave only 5.94 per cent.

These experiments, somewhat conflicting with each other, were not fully satisfactory as to the proper period or stage of ripening to cut the cane, but I was of the opinion that for either sugar or syrup, in this climate, the cane should be green and succulent, fodder also green, midrib just beginning to be dotted red, cellular structure, white, tinged with green, firm and solid; seed just beginning to be tipped red upon the inner envelope, just beyond the milk stage, cuts soft and doughy under the knife, the bottom joint is sweet but not more so than the top. It was quite evident that suckering the cane improves the quality of the juice in a marked degree.

The sorgho juice contains a larger relative quantity of pectine than that of the sugar cane, and its development is greatly influenced by the soil; so abundant is it in some localities that the syrup gelatinizes and becomes unfit for use. The particular characters of soil which favor the excessive development of pectine have not been investigated. It has been currently believed among syrup boilers, that the sorgho juice would not bear a high temperature and rapid boiling towards the close of the process. Dr. Jackson in his report contained in the Patent Office volume for 1857, observes upon this point: "It may now be boiled down quite rapidly to about half its original bulk, after which the fire must be kept low, the evaporation to be carried on with great caution, and the syrup constantly stirred to prevent it from burning at the bottom of the kettle or evaporating pan." This I believe

to be a fatal error, both in the manufacture of sugar and syrup, as the following experiment will show: An ordinary deep cow pot of 80 gallons capacity, was filled with juice and defecated as usual. I had prepared a quantity of dry pitch pine, split up quite small, and also a liberal quantity of fat lightwood (old dry pitch pine saturated with the inspissated turpentine, equivalent to the staves of rosin barrels,) started a brisk fire, and pushed it to the utmost capacity of the furnace; the bricks became white hot wherever the fire could reach them, the flame streamed out at the chimney top at a distance of twelve feet from the ground, and it was with difficulty we could maintain our positions around the furnace. Two hands were kept constantly employed in dipping and pouring back the foam to keep the pot and its contents together. The result was 16 gallons of syrup, the finest sample of near three thousand gallons boiled. Many kettles of syrup were burned and ruined by the fire getting *too low* towards the close of the process, and several by an ill-advised stirring. Our rule was to gradually augment the fire from the time the defecation is completed, until the syrup is finished. The bulk should remain the same throughout, as the water evaporates; let its place be supplied with foam, which should keep the kettle constantly full, and on no account stir it lest it become too cool and burn, — burn not under the bottom, but on top, where the only danger lies.

The reason of this is evident upon a little reflection. One who has witnessed the active boiling of a kettle of syrup, cannot fail to have noticed the constant active state of commotion which prevades the whole mass, effecting an object in the bringing continually fresh portions of the syrup in contact with the bottom and sides of the boiling vessel, and preventing a repose which would admit of overheating, a process of spontaneous stirring which cannot be successfully performed with a paddle. This state of commotion must necessarily exist in the bulk of the syrup when heated above the point of boiling, but if it be interfered with by stirring or damping down the heat, the exposed sides of the pan, covered with a thin stratum of syrup, become overheated, caromel is formed and washed down by the foam, when it shall again rise and fall, darkening the color and communicating the bitter caromel flavor.

Observation has shown, also, that long exposure to even moderate heat exerts a similar action upon saccharine solutions, effecting their gradual, slow decomposition, so there are two cogent reasons why the fire should be hot and the stirring omitted; first, because the stirring is effected more perfectly, and the sides of the pan constantly kept covered; and second, because the process of concentration is hastened and the period of exposure to the air greatly lessened.

During the fall of 1857, Mr. Joseph S. Lovering, of Philadelphia, conducted a series of very satisfactory experiments in the production of sugar from the sorghum, and placed the whole subject in a much more favorable light before the country. On the 28th of September, but about one-fourth of the seed having reached the milk stage, he examined the two lower joints with the

polariscope and found 5 per cent. of crystallizable sugar in the juice; two joints next above these showed 5.57 per cent. The S. G. of the juice was 1.065. Two days subsequently an effort was made to produce sugar, which resulted in a very dark, thick, viscid mass, which after standing ten days afforded a "pretty good crop of soft crystals" of dark color. On the 13th of October, about one-half the seed being ripe, a second experiment was made upon juice of S. G. 1.074, which gave 4 per cent. actual yield of crystallized sugar, and 9½ per cent. of molasses, or 13½ per cent. saccharine matter. The sugar was similar to the second quality Cuba sugar used by refiners.

Oct. 23d, juice weighed full 10° Braumé, polariscope indicated 7.29 of sugar in the juice.

2d November, the upper portions of the stalks turning yellow, the leaves dead and dry, juice from lower joints 10° Braumé, yielded sugar 5.58, molasses 7.14, in all 12.72. Sugar perfectly dry and worked without the slightest difficulty at every stage. The molasses was re-boiled and crystallized under disadvantageous circumstances, and afforded an additional quantity, which, added to the first, gives sugar 7.35, molasses 5.37. The top joints of the stalks used in this experiment yielded a juice of 12° Braumé from which was obtained 7.14 sugar, and 4.76 molasses, in all 11.90.

Mr. Lovering estimates the probable yield of an acre of canes of ordinary growth, such as he experimented with, as follows:

Actual yield as per experiment No. 4,	1221.85 lbs. sug.	84.39 gls. molasses.
Add for inefficiency of mill,	10 per cent.	
For heating and re-heating, &c.,	5 " "	
For footings, say but	5 " "	
	20 per cent.	244.37
	1466.22 lbs. sug.	74.39 gls. molasses.

He further observes that his estimate is based upon a yield of only 1847 gallons of juice, while another party in his own county reports 6800 gallons, and Mr. Peters, of Georgia, the season previous, a yield of over 2000 gallons of juice of a much higher specific gravity, and probably greater percentage of sugar.

Mr Lovering, after detailing his experiments, draws the following conclusions: "1st. That it is obvious that there is a culminating point in the development of the sugar in the cane, which is the best time for sugar-making. This point or season, I consider to be when most, if not all the seeds are ripe, and after several frosts; say when the temperature falls to 25° or 30° Fahrenheit. 2d. That frost, or even hard freezing does not injure the juice nor the sugar, but warm Indian summer weather, after the frost and hard freezing, does injure them very materially, and reduces both quantity and quality. 3d. That if the cane is cut and housed, or shocked in the field when in its most favorable condition, it will probably keep unchanged for a long time. 4th.

That when the juice is obtained, the process should proceed continuously and without delay. 5th. That the clarification should be as perfect as possible, by the time the density reaches 14° Braumé, the syrup having the appearance of good brandy. 6th. That although eggs were used in these small experiments, on account of their convenience, bullock's blood, if to be had, is equally good, and the milk of lime alone will answer the purpose; in the latter case, however, more constant and prolonged skimming will be required to produce a perfect clarification, which is highly important. 7th. That the concentration, or boiling down, after clarification, should be as rapid as possible without scorching, shallow evaporators being the best. 8th. With these conditions secured, it is about as easy to make good sugar from the Chinese sugar cane as to make a pot of good mush, and much easier than to make a kettle of good apple butter."

With reference to the economical production of sugar from this plant, no satisfactory conclusions can be drawn as yet; much careful experiment and research will be required to ensure the production of a juice which shall contain the maximum quantity of crystallizable sugar with the minimum of the objectionable vegetable principles. It is also probable that the discovery of some additional means of defecation may become necessary before the desired object can be realized. It would seem not unreasonable to believe that a plant so easily grown in all sections of our country, and containing, under favorable circumstances, so large a percentage of cane sugar, will eventually be made a valuable source of this important staple.

For the production of syrup, if we could but succeed in defecating the juice upon a large scale and by simple means of easy attainment, so as to make t keep good for an indefinite period, we should accomplish very much for the benefit of the Southern planter and the negro. It is found by experience that however well the syrup may be boiled, and however palatable it may be for the first few months, as the season advances, if it be not so thin as to ferment and sour, it undergoes a quiet, viscous fermentation, which renders it slimy, in some instances gelatinous, and always ruins the flavor. Until this trouble is overcome, the syrup will be made only upon a small scale, and this for early consumption.

In the production of alcohol from the sorghum upon a large scale, very little has been done in this country.

In France, on the contrary, it is for this that the plant is chiefly valued, and the juice is said to yield $6\frac{8}{10}$ per cent. of absolute alcohol, equal to 7.41 of the commercial rectified spirit, or say 12.60 of proof spirit. In the fall of 1857, a barrel of juice was set aside, with a few pieces of the bagasse put in it, and allowed to ferment spontaneously; upon the fourth day, acetous fermentation having commenced, it was distilled without any careful notes being taken of the yield. A sample of the doublings of S. G. 915 is herewith submitted.

Respectfully,

ROBERT BATTEY, M. D., Rome, Georgia.

ON THE ACTION OF OXIDE OF SILVER WITH ORGANIC MATTER.

Subject 17. — "The change which pills, containing oxide of silver, undergo, etc."

I have made a number of experiments in investigating this subject, but do not think them of sufficient importance to occupy the time of the Association by relating them in detail. Oxide of silver, in contact with moist organic matter, especially saccharine, evidently undergoes decomposition, accompanied with more or less evidence of chemical reäction, and resulting in the revival of the metal. I found this oxide prepared, according to the officinal formula, to be readily and entirely soluble in dilute aqua ammonia; but after having been triturated with sugar and water, when treated with aqua ammonia, a black precipitate resulted, which proved to be metallic silver, in fine subdivision.

Pills containing oxide of silver, made up with gum arabic and water, underwent no apparent physical change, neither did those made with gum and a small portion of syrup (just sufficient to form a pilular mass.) When made with a larger proportion of syrup or honey, so as to make a soft mass, there were more evidences of reäction, but the greatest change occurred in pills made up with confection of rose. Pills made from a mass made up with this excipient, I found in repeated experiments to soften, puff up, and become porous, remaining so for some time, then gradually drying into an amorphous, spongy mass. The time elapsing before this swelling, etc. commenced, varied from half to several hours. In one case, the pills made up with the confection on a dry day, remained unchanged for several days, when the weather becoming damp, they softened and swelled up as before.

Thinking the astringency of the confection might have something to do with this reaction, I made up pills of the oxide with tannin and syrup, and also with the addition of acetic acid, but these kept without change.

I conclude that the cause of the greater change in the pills made with confection of rose, is the greater bulk of vegetable matter they contain, and that they continue moist longer than those made with mucilage or syrup. I found, however, that a portion of silver is revived, even in those made up with gum and water; upon treating pills thus made, with aqua ammonia, metallic silver was left. There is no reason to suppose that this decomposition of the oxide is of any importance in a medical point of view; the metallic silver, being in very fine subdivision, is probably equally efficient with the oxide.

In regard to the second point of the question, there is no difficulty in avoiding any *visible* change in pills containing oxide of silver, as none occurs when they are made up with gum and water, or even with gum and syrup, provided there is no more syrup used than is necessary to form the mass, so that the pills will dry rapidly.

AMBROSE SMITH.

ON THE DETERIORATION OF THE DRUGGISTS' STOCK, AND THE BEST MEANS OF PREVENTING IT.

In answer to the Query No. 40, submitted to me for examination at the last Annual Meeting, I am only able to make a partial report, with the explanation, that in addition to my usual business and pharmaceutical and other public engagements, I have during the last three months edited a second edition of my work on Pharmacy, to which I have added about one hundred pages of new matter, and re-written many chapters contained in the previous edition; so that I cannot be charged with indifference to the cause of pharmaceutical progress.

The question pertains chiefly to the deterioration of pharmaceutical preparations, but I believe that crude drugs, or drugs in powder, are quite as frequently liable to spoil on our hands, and equally require the adoption of precautions to prevent changes. The most common causes of injury to the different articles of the druggists' stock, are the following:

1st. Fermentation, putrefaction, mould or must, changes all produced by similar influences, though under somewhat different circumstances, and upon different kinds of organic bodies.

2d. The influence of worms or insects feeding upon drugs, of organic origin.

3d. Oxidation, "nitrification" of both inorganic and organic bodies by the influence of the atmosphere.

4th. Deliquescence, efflorescence and the dissipation of volatile ingredients, and the absorption of carbonic acid.

5th. The admixture of foreign bodies, dust, &c., with drugs.

A few remarks under each of these heads may serve to explain more fully the nature of the changes to which these queries have reference.

1st. Fermentation differs from putrefaction chiefly in the phenomena by which it is accompanied, and the constituents of the organic body subjected to its action; both are occasioned by the action of a nitrogenized substance called a ferment, which has the property of disturbing complex organic substances, reducing them to simpler forms; these simpler forms are carbonic acid, alcohol, or acetic acid and water in the case of starchy and saccharine bodies; and in nitrogenized bodies, several gaseous products containing sulphur and phosphorus, and causing the odor which we call putridity.

In the production of mould a cryptogamic growth occurs on the surface, causing a change in the grouping of elements in the part immediately in contact, though without the production of alcohol or acetic acid. Must, seems to be occasioned by an analogous change though to a less extent.

One peculiarity is observed in all these changes: they all require the presence of moisture, and may be entirely prevented by the artificial desication of drugs and their complete exclusion from the air and moisture.

Fermentation in syrups, fluid extracts, extracts, honeys, and confections, is usually caused by deficiency in the proportion of the saccharine ingredient, which must exist in the proportion of two parts of nearly dry sugar to one of water; or by the incomplete separation of the nitrogenized ingredient, generally vegetable albumen, which, being coagulable by heat, should be removed in the process of preparation of most complex liquid saccharine preparations.

Several syrups, such as compound syrup of squills, and syrup of seneka, are especially liable to fermentation, and many expedients have been adopted to diminish this tendency; they should always be carefully made with strict regard to the official directions, not only in the full weight of sugar directed, an accurate measurement of the quantity of liquid, the careful coagulation of vegetable albumen and its separation on a filter, but also in the final adjustment of the proportions, so that neither the sugar nor the liquid shall be in excess. The best way to keep these easily fermentable syrups is to fill bottles not exceeding a pint in capacity, completely full, seal them over and put them away in the cellar, or in a place where the temperature is not variable; the bottles should be thoroughly dried after being washed and before introducing the syrup. It is remarkable that acetic acid, one of the chief products of fermentation, is a most effectual preventive of the process; it is by its production in fermenting liquids that they are prevented from being completely resolved into the products of fermentation, and when introduced in advance, it prevents the process entirely. I am not aware of the smallest proportion that will be effectual, but believe that a single fluid drachm of acetic acid will generally preserve a pint of syrup. I have tried glycerin as a preventive in the case of Coxe's hive syrup, but with unsatisfactory results, the syrup after a time became sour.

Where the use of alcohol is resorted to for this purpose, I think the purest and strongest to be obtained is least objectionable — a small proportion will be found effectual.

2d. The most difficult to avoid of all the causes of deterioration in drugs is the production of larvæ from microscopic eggs deposited in the plant before it leaves the ground; roots are particularly liable to be infested with these, and even the most poisonous, bitter and odorous roots are often found to be completely riddled by insects in the drawer or bottle in which they have been carefully laid. The only remedies that I know of for this evil are the heating of the root, if it contains no volatile principle to be preserved, to a temperature of 180° or perhaps to 212° before putting it away. This has been especially recommended in the case of taraxacum, and is said to destroy the eggs or to prevent their producing the insects. It has been proposed in the case of ergot to place in the bottle a piece of camphor, or some cotton impregnated with oil of turpentine or ether, and it is stated that the vapor of these is fatal to these pests. Its efficacy should be further tried. An analogous

fact, recently stated, is, that a few cardamom seeds thrown into a drawer of coriander will completely prevent the depredations of the insects that devour that article. The exclusion of light, though perhaps not entirely effectual, is believed to be advantageous in many instances. In the case of sambul root it has been observed that a specimen kept in a tin can was much better preserved than one in a well-stoppered salt-mouth bottle. A complete trial of this remedy for the depredators upon medicinal roots would, however, require experiments to be extended over a great length of time.

3d. The oxidizing influence of the atmosphere is, of course, a prolific source of changes throughout the material world. Under the influence of the life force, plants draw from the atmosphere the chief elements of their growth, and as soon as this force is withdrawn they become a prey to its destructive influences. Fermentation and putrefaction occur only in complex organic bodies in the presence of moisture. They are in fact almost characteristic of liquids, or soft solids, and when once set on foot proceed independently of the atmospheric influence. Not so with the destructive process of oxidation, to which a great variety of substances, both of organic and inorganic origin, are subject.

Inorganic substances are often oxidized by the air, producing sensible changes, which in the metals are called tarnish or rust, in mineral substances oxidation, in pigments, bleaching, etc.; that peculiar modification of atmospheric oxygen, called ozone, appears to be especially active in these changes. The kind of oxidation called eremacausis or decay is probably more injurious to the druggist's stock than has been suspected. This affects organic bodies so slowly as to be imperceptible except during considerable lapses of time, and may account for that species of deterioration universally acknowledged and appreciated, which prompts to the distrust of old drugs and the universal preference for a fresh article.

The influence of this spontaneous change upon extracts is one of the most curious that falls under our observation. Extract of belladonna, when kept a long time, under ordinary circumstances, is found to be so full of crystals as to be unfit for its ordinary uses; some old specimens, even have the appearance of impure crystalline masses; these crystals are found to consist mainly of alkaline nitrates. It has been observed in relation to old extract of hyoscyamus, that the interior of the mass contains carbonate of ammonia, while the surface is covered with needles of nitrate of ammonia. The presence of such large portions of ammonia under these circumstances can only be accounted for by the known fact that organic compounds have the property of absorbing nitrogen from the air during eremacausis, and of developing it into ammonia and nitrous acid. How far the characteristic alkaloids present in these extracts are affected by these changes, is worthy of investigation.

It is to a similar though not identical class of phenomena that the

changes observed in essential oils belong; most of these, by long exposure to the air and light, change color, become less limpid, and lose their delicacy of fragrance; so marked is this change, that it frequently renders these oils unsaleable and quite worthless. The remedy usually prescribed for this resinification of essential oils is in re-distillation. They should be mixed with water, sometimes with portions of alkali, in a still, and re-distilled.

Another process for the recovery of resinified essential oils, that of M. Curieux, published in the American Journal of Pharmacy, Vol. XXX, page 399, is less troublesome. It consists in submitting resinified essential oils to the action of a solution of borax with animal black; the solution of borax is mixed with the animal charcoal to form a thin magma, the oil is then added and agitated for fifteen minutes. This process has been found successful with oil of lavender, peppermint, and neroli; the acid resin seems to combine with the borax, and to form a mass which adheres to the sides of the bottle, while the oil floats above with its original limpidity and fragrance.

My friend, Charles Bullock of Philadelphia, has found that permanganate of potassa, by its deoxidizing properties, is admirably adapted to the restoration of certain essential oils; the particular one experimented with was oil of lemon, a large can of which was completely restored from having become quite unsaleable, by mixing with a solution of the proportion of one ounce of the salt to eight fluid ounces of water, and agitating for a length of time, then decanting, mixing with fresh water, and gently warming till the oil floated perfectly clear and limpid on the surface — the quantity named was sufficient for four pounds of the oil — this was more remarkable from the fact that distillation was quite unsuccessful in ridding this sample of its terebinthinate odor.

The organic coloring principle which pervades the leaves of plants, called chlorophyle, seems one of the most delicate of Nature's products; by its shade of color we are enabled to judge of the perfect development of a leaf, or the herbaceous part of a plant, and to determine its freedom from decay. Arguing from the facility with which this principle is changed by the action of light, and from the known fact that many substances which are readily decomposable by the combined influence of air and light, are preserved unchanged at the same temperature and degree of exposure to the air, in the dark, we are justified in setting a high value on those precautions adopted by careful pharmaceutists to preserve organic substances, protected from light, as well as from moisture and other unfavorable influences.

The remarks thus made upon leaves and their characteristic coloring principle are still more applicable to flowers, which quickly fade under circumstances of exposure to light, and generally, though not in every instance, lose their characteristic odor with their delicate color. The French or red rose is an instance of a flower that partially bleaches by light without losing its odor.

4th. The causes of deterioration next to be noted are exceedingly familiar to every practical pharmaceutist and druggist. Acetate of potassa may serve as the type of deliquescent salts; these should always be carefully kept from access of air, taken out from the bottle with a dry spatula, and kept near the stove or in a dry part of the store — they are happily easily restored when damp, by careful drying in an oven or upon a sand bath. There is a difference of sentiment as to whether a salt-mouth or cork-stoppered bottle is to be preferred for deliquescent salts; unless the salt-mouth is very well ground, the cork is to be preferred. Perfect dryness should always be insisted on in preparing a bottle for receiving a deliquescent salt.

Efflorescent salts are less troublesome; they only give us the inconvenience of adjusting the weight in dispensing, so as to allow for the loss of water of crystallization. As a general rule, they should be kept on hand and prescribed in the form of dry powders, such as the sodæ carbonas exsiccatus of the shops.

Carbonate of ammonia is one of the most unprofitable articles in the shop, on account of its constant loss of weight by evaporation and its change into bicarbonate. I have found great economy in keeping this in a bottle constructed specially to exclude the air. There is a kind sold by grocers, imported full of prunes; a metallic screw is fitted on to the outside of the neck of the bottle, to which a cap of the same material is fitted; this cap is fitted with cork in the inside of its top, and this presses, when the cap is adjusted in its place, directly on to the bottle.

I have brought with me a sample of a bottle made in Philadelphia for preserving fruits out of contact of air, which possesses great advantages for the preservation of carbonate of ammonia and similar articles.

Tin cans are increasingly in use, of late, for preserving vegetable substances from light and air. I also show one of these.

This interesting subject is but touched in this essay, and I shall take pleasure in pursuing it further at a future time, if desired by the Association.

REPORT ON FITTING UP AND ORNAMENTING DRUG STORES.

At our last meeting I was called upon to furnish an "Essay upon the fitting up of Drug Stores," with regard to the combination of convenience and display. And in undertaking this task, I do so, not under the impression that my individual ideas are superior to those of my brethren in the profession, but, having been honored by the acquaintance of some of the most eminent druggists in the United States and Great Britain, I am indebted to them for the advantage of their combined opinion, as much as to any practical knowledge I may have acquired by the many stores I have been wholly or partially engaged in fitting. That a systematic arrangement of the appliances and appointments of the business of men is essential in a great degree to success,

will be disputed by none but the careless and indifferent; and if there is one branch of science more than another in which methodical arrangement is imperative, it is that of Pharmacy.

Very many of the fatal accidents arising from the erroneous dispensing of drugs, may be attributed, in the first place, to a non-systematic arrangement of the principal ingredients composing prescriptions; and secondly, to that want of privacy so essential to the dispenser whilst in the performance of his most important duty.

In fitting a store I should most strenuously advise the "Retail" and "Dispensing Departments" to be kept separate. This may be effected, even where room is an object, by having the dispensing counter with upright glass-case in front; or, if the counter will admit, two cases with mirror in centre, which not only forms an ornament to the store, but advantageously displays perfumery, pomades, etc. The back of the case or cases should be fitted with shelving for conveniently sized bottles to contain those tinctures, powders, etc., most generally employed in dispensing, as well as drawers for pill and powder boxes, corks, etc., not forgetting a well-assorted label-drawer; in short, the dispensing counter should be a dispensary on a minute scale, as I hold it important that from the time the dispenser receives his prescription he should not have occasion (under ordinary circumstances) to leave his dispensing counter until the medicine is ready for delivery. I may here remark the necessity of good and well-stoppered bottles, to prevent loss and consequent deterioration; in fact, it would be well could we introduce the glass cap, as in England, and the deep, blue bottle, for certain tinctures, acids, powders, etc., whose medicinal effects are impaired by the action of the light. I need scarcely mention the necessity of a correctly labelled store, still I would impress upon the minds of the profession the danger of using bottles containing a drug other than that which its regular label designates. I have seen in some stores a pen and ink label attached to a bottle. How likely is this to become detached by washing the bottle or otherwise? And in the event of the absence of the regular dispenser, how fatal may be the result? Besides, it shows a want of due care, and is frequently the cause of much hesitation and confusion in serving an article, as well as detention of the person requiring medicine. The scrutiny of the non-professional observer is not unfrequently drawn to this state of things; he may imagine his wants doubtfully responded to, or, losing confidence, may seek elsewhere for what he considers skill and safety. But apart from these considerations, a neat gilt label adds greatly to the beauty of the store, and customers think where care is shown to the labelling of the article, there will be a corresponding attention paid to every minutia.

A room, where convenient, at the back of the store should be used for rough work, such as preparing ointments, syrups, etc.; and should contain a large wooden case, with cupboards and shelving for macerating tinctures, etc.,

as well as a shelf perforated for funnels and percolators, that an uninterrupted course of filtration may be carried on. Here, also, should be found a sink, etc., for the immediate cleansing of bottles, mortars, etc.

In the retail department, the counter being supplied with slides, cupboards, etc., the space usually employed for serving may be used for the display of goods in glass-cases; and the most convenient kind I have yet met with is a flat case, similar to what are generally used, but not so wide, the back part raised some eight or nine inches high, and as many wide, forming at the same time a separate case opening at the back, leaving a space underneath for the use of cut paper, twine, gum-pot, etc.; thus preventing the necessity of applying to the resources of the dispensing counter for the means of putting up parcels, etc. It should be our care to have all our preparations, perfumery, etc., so displayed that both ourselves and the buyer may be reminded what is before us.

With regard to the general fitting and decorating of a well appointed drug store, I should advise the painting of the inside to be always of a light color; and at the back of the bottles a rich salmon or peach-blossom, but never green, on account of its absorption of the light.

The drawers should be of mahogany or other dark wood, their height from the floor to the top not to exceed three feet six inches. By this arrangement convenient cupboards may be formed at the end of the store and behind prescription departments, to contain vials, herbs, etc.

The shelves to be painted white, tipped with mahogany, and the cornice not too heavy.

I might say much with regard to the ornamenting of the windows; but, fearing I might be likened to the citizen who thought there was nothing like leather to fortify the city, I shall leave that subject to your own consideration, knowing the spirit of the age is evincing itself in drug stores equally with other business establishments; and, instead of the dismal shops of old, reminding one of death at their very doors, we now find them beautiful specimens of artistic device, embellishing the locality in which they may be erected.

In conclusion, should the suggestions offered in this short sketch prove of practical value to one member of the profession, I shall be amply satisfied.

F. HALE, New York.

REMARKS ON THE ACTIVE PRINCIPLE OF CORNUS FLORIDA.

BY JOHN M. MAISCH.

No complete analysis has as yet been made of the barks of the various species of Cornus. In volume VII. page 109, of the American Journal of Pharmacy, Mr. James Cockburn details the results of a number of experiments made with the bark of cornus florida, which are not without interest,

but leave us in the dark about the nature of the true active principle of this indigenous tree. This is ascribed by him and by other investigators to "bitter extractive," a name which has to cover a multitude of compounds, difficult to isolate.

In compliance with the subject accepted by me for investigation for the American Pharmaceutical Association, I have directed my efforts principally to the isolation of the active part of this bark, without taking much notice of the other principles it contains; but it was necessary to first obtain some information about these other constituents.

I have therefore repeated and variously modified some of the experiments made by Mr. Cockburn, and find them mainly correct; I was unable, however, to obtain the crystalline substance of which he speaks, and for which I did not search any farther, as these crystals are stated to be entirely tasteless, and my main object lay in a wholly different direction.

Alcohol and water, both extract completely the bitter taste of the bark of cornus florida, leaving a tasteless residue which imparts no taste to a diluted acid. It is therefore unnecessary, for the extraction of the bitter principle, to contaminate the exhausting liquid with a foreign acid, which would serve no other purpose except to require to be removed again. By extracting the bark with alcohol, the tannin, resin, some waxy matter, free acid, etc., are taken up and interfere with the purification of the extract. Water dissolves no resin, wax, or fatty matter, but on the other hand takes up some gum which may be easily got rid of. Alcohol and water dissolve the whole of the coloring matter.

The neutralization of the free acid, contained in the infusion and tincture, does not visibly affect the appearance of the liquid; an excess of alkali deepens the color somewhat, without otherwise disturbing it; alkalies cause no precipitate of the bitter principle. It was to be inferred, inasmuch as most alkalies are but sparingly soluble in water, that the bitter principle was not of an alkaline nature. If it is of neutral behavior, the aim, it appeared, must be to remove the other substances so as to retain the bitter active body in solution; or else, take it up by a solvent, which leaves the other bodies behind.

Without attempting to enter into detail on the various experiments made for this purpose, I may as well state the result of my investigations, giving some explanations afterwards.

I have succeeded in obtaining the bitter principle of the bark of cornus florida in a perfectly *colorless* and *neutral solution;* but all attempts to evaporate the liquid without decomposition have signally failed. No matter whether the alcoholic or the aqueous colorless solution is evaporated by rapid boiling, at a moderate heat, at ordinary temperature, in a current of dry air or over sulphuric acid under a bell glass, in all cases a brownish color is produced, which is deepened as the liquor is concentrated, and a dark brown extract is left behind without the least sign of crystallization.

This colorless solution of the active principle may be obtained in various ways; I have found the following to be the least troublesome:

Coarsely powdered dogwood bark is twice boiled with water, and the expressed clear liquid is precipitated by solution of subacetate of lead; a flesh-colored curdy precipitate takes place, which, on stirring, becomes very voluminous, and now contains the tannic and gallic acids, gum, coloring matter, etc. The liquid, which is filtered off from the precipitate, is destitute of color, and contains the bitter principle, together with free acetic acid and an excess of the precipitant. The excess of lead may be removed in various ways, either by a little sulphuric acid, or by sulphuretted hydrogen; if sulphuret of ammonia, or an alkaline carbonate is used, the alkali serves to neutralize the free acid; the former precipitants require the subsequent use of an alkali to saturate the acid.

Now, in whichever way the lead has been removed and the acid neutralized, the solution remains colorless and neutral for some time at ordinary temperature; but if it continues in contact with the air, and is allowed to evaporate, a decomposition takes place and an extract remains behind, which is still of a neutral reaction, if for the neutralization of the free acetic acid a fixed alkali has been employed; if, however, ammonia has been used, the extract will have a slight acid reaction from the formation of the acid acetate of ammonia and the expulsion of some of this volatile base. When evaporated to a syrupy consistence, and now mixed with strong alcohol, the whole liquid is redissolved with the exception of a white crystalline precipitate of alkaline acetates, and sulphates. All the coloring matter goes into solution, and on evaporation a bitter-extractive mass remains, which is wholly soluble in water and alcohol. Its solution is again precipitated and decolorized by subacetate of lead, and the filtrate has now the same behavior as in the first instance.

By digesting the decoction with carbonate of lead, litharge or hydrated oxide of lead, the tannic acid of the dogwood bark is precipitated, but at the same time the liquid is rendered turbid by keeping some lead in suspension, which is not removed by filtration; as it passes the filter the liquid is still turbid, and to render it clear, requires to be treated with sulphuric acid or sulphuretted hydrogen, in order to precipitate the lead, which at the same time throws down a considerable amount of coloring matter, but leaves the filtrate still with a decidedly brown color, which cannot be removed in this way.

A similar result is obtained if the removal of the tannin is attempted by precipitating it with gelatine; the whole amount is not very readily thrown down, and the filtrate has retained a good part of its coloring matter.

More completely than by the latter two ways will the decoction be decolorized by first dissolving in it some alum, and precipitating it again by one of the alkalies, or their carbonates. The alumina which precipitates, will also carry down all coloring matter and tannin, so as to yield a clear colorless

filtrate, which, besides the excess of the saline additions, contains the whole of the bitter principle. If this solution is now evaporated, the same change takes place with the organic matter; it turns dark; from the syrupy residue, the saline admixtures are thrown down by strong alcohol, but the coloring matter is dissolved, and, on evaporation, a bitter extract is left behind, without any traces of crystals. The extract, dissolved in water, and treated with alum and an alkali as before mentioned, again yields an almost colorless solution, which shows the same behavior as before.

In the above experiments, after the bitter principle had been repeatedly deodorized and evaporated, the precipitates of lead or alumina would not carry down the whole of the coloring matter, but leave the filtrate of a yellowish color, which grew deeper with a repetition of the experiment; the bitter taste of the resulting tincture and extract was now perceptibly less marked, and had nearly entirely disappeared in two specimens of extract, which had been thus treated, and afterwards kept for six months exposed to the air.

I have mentioned above in which various ways I attempted to evaporate the clear solution so as to prevent change, and it is unnecessary to dwell more upon this matter, as the result has been nearly the same, the chief difference being a somewhat higher or less degree of color.

A number of experiments were undertaken with the view of obtaining a precipitate from the colorless solution, which should contain the bitter principle; but all attempts have so far been fruitless. It was thought that an ethereal solution might be less likely to become colored, as its evaporation might be carried on at a very low temperature, and the ether itself would act as a deoxidizer. But no such solution could be effected; ether would not take up the bitter principle from water or alcohol, nor would it cause its precipitation from the spirituous solution.

The presence of free alkalies or acids, during evaporation, appears to hasten the change of the bitter principle; the solution resumes a color of a marked deeper tint, and the peculiar odor exhaled from a decoction of dogwood bark, seems to be stronger.

If I may be justified to deduce any inferences from the results of the experiments as stated above, they would be as follows:

The bitter principle of the bark of cornus florida is a colorless, neuter, persistently bitter substance, which is very soluble in water and alcohol, insoluble in ether, not precipitated by chemical re-agents, but very easily affected and destroyed by exposure to the air.

This at the same time furnishes an answer to the other questions propounded to me; my inability to obtain the active principle in a pure state rendered a comparison with quinia impossible.

My experiments imply some useful hints regarding the mode of making pharmaceutical preparations of dogwood bark. Contact with the air and exposure to heat, it would appear, must be avoided; a solid extract is best evap-

orated in vacuo; in preparing a fluid extract, the liquid ought to be brought under the protective influence of sugar as soon as possible. For such preparations, water is a better exhausting menstruum than alcohol, which would take up inert resinous matter; this, in its pure state, is almost white, crummy, soluble in alcohol and ether, also, in alkalies; destroyed upon platina foil without fusion, leaving much charcoal; it is tasteless, and apparently without influence on the human body.

Although having failed so far in my attempts to isolate the bitter principle of cornus florida in a crystalline state, I intend to institute further researches upon this subject, the results of which I may probably lay before the Association, if they should prove to be new and more satisfactory. The isolated principle will, no doubt, be interesting, but, I suppose, of little practical value, if we are to judge by the above properties.

I may remark yet, that I have also somewhat experimented with the bark of cornus sericea, but with no better result.

ON PEPSIN. — (*Chymosin Gasterase.*)

BY A. CUSHMAN.

The gastric juice has long been recognized by physiologists as the active agent of digestion, but the real extent of its powers, or the conditions necessary for their exercise, have not been positively settled until within a few years. The German chemists, about the year 1834, commencing with Eberle Wasmann and Schwann, were the first to start the line of investigation which finally led to our present very accurate degree of knowledge; and the careful experiments of many observers since that time have left us, in fact, little to discuss in relation to this very interesting subject. While, therefore, I cannot promise much that may be really novel in this connection, I propose to lay before the Association, in as condensed a form as possible, the history, chemical and physiological, and the mode of preparation of PEPSIN, the active principle, so to speak, of the gastric juice. In doing this I will endeavor to confine myself solely to well-authenticated facts, without noticing the many ingenious and often conflicting theories which have from time to time been advanced by various writers, and which would tend rather to embarrass than assist us in forming correct conclusions.

The solid constituents of pure gastric juice are in very minute proportion to its weight. In a specimen of human gastric juice collected by Beaumont, Berzelius found 1.27 only of solid matter; in that of a dog, Blondlot found but 1.00; others have met with different proportions, but in no case does it ever appear to reach 2.00. Of this solid matter about two-thirds is found to consist of pepsin, and the remainder of earthy, metallic, and alkaline chlorides and

phosphates. Pepsin was first isolated in a tolerably pure state by Wasmann. His method consisted in digesting strips of the glandular lining of the stomach of the pig for several hours in water, at a temperature between 80° and 100° F. The first liquid was rejected as consisting principally of mucus and other inert matters. The membrane, well washed, was again digested in water at the ordinary temperature, until a putrid odor began to be developed. This liquor, when filtered, was transparent, viscid, and without any re-action. It was then precipitated by subacetate of lead, or corrosive sublimate, the precipitate carefully washed was decomposed by sulphuretted hydrogen, and from the filtered liquid, pepsin, in white flocks, was precipitated by alcohol. The pepsin thus obtained forms, when dry, a yellow, gummy, slightly hygroscopic mass; in its moist state it is white and bulky; it dissolves readily in water, and always retains a little free acid, so as to redden litmus. It is precipitated by alcohol from its watery solution; mineral acids induce a turbidity in a solution of neutralized pepsin, which disappears on the addition of a small excess of the acid; but if there be a considerable excess of acid there is a flocculent deposit; it is only imperfectly precipitated by metallic salts, and not at all by ferro-cyanide of potassium; it has been asserted that pepsin is coagulated by boiling, but Frerichs has shown that the coagulation is merely dependent on its admixture with albumen.* This admixture it is almost impossible to avoid, as the albumen is so intimately associated with the other soluble portions of the stomach, and is precipitated by the same re-agents which throw down the pepsin. In the extraction of pepsin by this method it is associated also more or less with *peptones*, or substances which have entered into a soluble modification with pepsin. Even when pepsin has been separated with the utmost care by precipitating fresh, filtered, and concentrated gastric juice with alcohol, it has been found impossible, up to the present time, to obtain it sufficiently pure for exact ultimate analysis. No two products ever afford the same precise results, though the following, by Schmidt and Vogel, give an approximate idea of its composition.

	Vogel.	Schmidt.
Carbon, . .	56.723	53.000
Hydrogen, . .	5.666	6.700
Nitrogen, . .	21.088	17.800
Oxygen, . .	16.523	22.500
	100.000	100.000

The contaminations above-mentioned are too unimportant, however, to affect the therapeutical action of pepsin, and for all practical purposes it is easily obtained of requisite purity. It has been a question whether the properties of pepsin do not vary with the different species of animals from which it is

* Lehman, Phys. Chem., Vol. II. page 47.

derived. Upon theoretical grounds the stomach of the pig would seem likely to furnish a product most analogous to that from the human stomach; but it is certain that the same substances are dissolved with equal facility by pepsin obtained from the stomach of calves, sheep, dogs, etc.; chemical analysis throws no light upon this point, nor have there been made any comparative experiments of sufficient authority to decide it. We may therefore conclude that for medical purposes it matters little which of these sources we select. In my own experiments I have been best satisfied with the stomach of the pig for ease of manipulation, and abundance of product, and until some decided advantage can be proved for the others I would give this the preference. Herein I confirm the views of the German experimenters, but I observe that the English generally employ the stomachs of sheep and calves, and the French those of sheep. On this and some other practical points I had hoped to lay before the Association some facts from the experience of others who have long made pepsin a special study. With this view, in February last, I addressed M. Boudault of Paris, who was one of the first to prepare pepsin in a suitable form for administration, and whose article has lately been somewhat advertised in this country. Accompanying my note with a copy of the "Proceedings" of the last meeting of the Association, I requested him to favor the Association, through me, with some of the results of his undoubtedly extensive observations. Mr. B. having seen fit to take no notice of this request, I am unable to complete this part of my intention.

Of the actual converting power of pepsin we have no positive knowledge. According to Wasmann, a liquid which contains only $\frac{17}{10000}$ of acetate of pepsin, and six drops per ounce of hydrochloric acid, will dissolve a thin slice of coagulated albumen in six or eight hours; with ten or twelve drops of acid per ounce, it will dissolve the same in two hours. A liquid which contains half a grain of acetate of pepsin, and to which hydrochloric acid and white of egg are alternately added, so long as the latter dissolves, is capable of taking up 210 grains of coagulated albumen, at a temperature between 95° and 104° F. It would *appear* from this experiment that hydrochloric acid is the true solvent, and that the action of pepsin is limited to *disposing* the albumen to dissolve. Diluted hydrochloric acid alone will dissolve coagulated albumen at a boiling temperature, but the presence of pepsin determines the same result at about the ordinary temperature of the living body; and upon this rests its peculiar physiological value. Liebig contends that pepsin does not exist as a distinct compound, but that gastric juice owes its solvent power to the gradual decomposition of a matter dissolved from the membrane of the stomach, which, aided by the oxygen introduced with the saliva, acts in its turn as a species of ferment upon the food, producing changes in its atomic condition which fit it for assimilation. But subsequent investigations have placed it beyond a doubt, that gastric juice, so far from

behaving like a ferment, is directly antagonistic to all known kinds of fermentation, and has definite limits itself, a property distinguishing it from fermentation, which is continuous *per se* to an indefinite extent.

The gastric juice used in chemical investigations is usually obtained directly from the stomachs of living animals by the establishment of artificial fistulæ, through which it is conducted by a silver tube properly secured. The animal is fed with bits of bone or other indigestible substances which stimulate the discharge of the gastric fluid without much affecting its purity. The fluid is thus drawn off as required, and the tube is so arranged as to be closed and opened at pleasure, the animal apparently not suffering in its health from the operation. Blondlot was the first to establish these artificial fistulæ as a source of pure gastric juice; he mentions that a small dog on which he operated furnished easily 100 grammes, or about three fluid ounces of gastric juice at a time, and had continued to do so for two years, and enjoyed his usual health. After Blondlot, we are indebted to Bardeleben * for great improvements in the method of operating these fistulæ. For the purposes of the pharmaceutist, however, this plan would not of course be available, and we have to content ourselves with what is termed the artificial digestive fluid for the production of the pepsin used in medicine. That this fulfils every purpose, is abundantly proved; the glandular membrane of the stomach yields its pepsin readily to water; and with the precautions mentioned above it may be obtained tolerably free from mucus and other admixtures. The precipitate with subacetate of lead is a white, curly, rather tenacious substance which in that state is rather difficult to operate upon with sulphuretted hydrogen. I have obviated this by drying the precipitate upon paper, rubbing it to powder with an equal quantity of sand, and then mixing it again with distilled water, which mixture the gas will permeate freely. The best method of obtaining the pepsin after its liberation from lead by the gas is to evaporate the filtered solution *in vacuo* at a temperature not exceeding 104°. When precipitated from its solution by alcohol it is thought by some to act with less power on fibrine, though otherwise its properties are not sensibly affected, and its solution in water, slightly acidulated, will effect the usual phenomena of digestion. Pepsin is not injured by a low temperature; its solution may even be frozen without deterioration; but heat, a very little above 100° F. destroys its digestive power beyond remedy. It will not exert its action except in the presence of an acid, and of none effectually, except lactic and hydrochloric acids. The latter has been decided to be the one present at the beginning of the digestive process in the living stomach, while the former, becoming developed during its course, exerts in its turn certain peculiar functions. Besides these two, there are also generally found other acids, as phosphoric, acetic, and butyric, in varying, though small proportions. Alkalies and the alkaline salts exert a destructive influence on the solvent power

* For a full description of his process, see Lehman's Phys. Chem., Vol. II. p. 42.

of pepsin. The presence of oil facilitates digestion by pepsin, although the oil itself is not acted upon by it.

In considering the physiological relations of pepsin, the important fact must be remembered, that its action is limited entirely to nitrogenous substances. It has no solvent power on fat, starch, sugar, gum, pectine, gelatine, etc. If therefore we are to look for its favorable action in cases of dyspepsia, it should be where the diet is mostly albuminous and fibrinous, not certainly under the farinaceous diet usually found to agree best with the dyspeptic. If the stomach will not digest meat, and the presumption consequently is a deficiency of pepsin, it is for the practitioner to consider whether the stomach will be more likely to regain its normal state by being supplied with artificial pepsin, and food otherwise indigestible to it, or by restricting the diet to such food as *can* be assimilated, and pursuing the usual course of treatment to restore its functions. The cases, however, are very rare where the gastric juice, when secreted, is deficient in the amount of pepsin necessary to give it virtue. Either the gastric glands, from disease or debility, fail to act at all, or act but feebly, or there is a want of balance in some of the other conditions on which digestion depends, so that perhaps excessive acidity puts a stop to the process. In either case, artificial pepsin would probably be of less benefit than attention to diet and hygiene. So far as the actual process of digestion is concerned, as it is carried on normally in the living system, pepsin is but one of a series of substances of which each contributes its share, and each is essential to a perfect result. Thus the saliva, the lactic acid, the pancreatic juice, the intestinal juice, and the bile, all exercise their special functions, and it is by their combined influence only that all the elements of mixed food can be reduced to the proper state for assimilation. "Hence we see," says Dr. Carpenter, in his Human Physiology, in summing up the article on the functions of gastric juice, "the process of digestion, so far from being completed in the stomach, has only been carried one stage further."

Some notices have lately appeared of pancreatin, an active principle, bearing the same relation to the pancreatic juice, as pepsin does to gastric juice. It is stated, on the authority of an English physician, that it is far superior to pepsin as a remedy for indigestion. It is true, it will act on some substances not capable of solution by pepsin, but otherwise it is liable to the same class of objections, and will not probably be found of sufficient value to reward the extreme difficulty of obtaining it. The pancreatic juice is found to have a special effect upon fats and oils which pass from the stomach undisturbed by gastric juice.

The administration of pepsin has been mostly confined to the forms of solution in water or wine, powder, and pills. Strong spirit precipitates it, and syrup is partially changed by it. As it attracts moisture from the air, Bondanet adopts the plan of mixing it with powdered starch, in the proportion, I believe, of one grain pepsin to fifteen starch. This powder he claims

will keep in a dry place any length of time, the starch serving also to conceal in some degree the peculiar taste of the pepsin. Under the name of "Liquor Pepticus Preparatus," the English have made use of a solution of pepsin in water, with a small percentage of alcohol, added to preserve it. A sample of this, for which I am indebted to the kindness of Prof. Sheridan Mushpratt of Liverpool, is presented. To this solution the taste and odor form an objection, though these might, of course, be disguised. The pills, as prepared by Hogg, of Paris, are covered with a suitable coating to prevent the access of air, and are, of all the forms I have seen, the most convenient and elegant. A sample is presented, but I have not had time as yet to examine them fully as to composition. From the appearance of their solution in water, I should judge the pepsin used was prepared by precipitation. I have myself prepared a *glycerole* of pepsin or concentrated solution in glycerine, but have not yet tried it sufficiently to speak positively of its merits.

I in fact deferred commencing my own experiments for a long time, awaiting a reply from M. Boudault, which I hoped would enable me to avoid some trouble in the matter of practical details, on which, doubtless, he could, if willing, have communicated facts of value. I shall, however, continue the subject, and note my observations during the year, and if worthy, report them at our next meeting. Meanwhile I will conclude by quoting the convenient method adopted by Lehman, for procuring a digestive fluid for the purpose of exhibiting the action of gastric juice, and as a source of pepsin for those wishing to experiment.

The stomach of a recently killed pig having been properly cleaned, I detached from it the portion of mucous membrane in which the gastric glands chiefly lie. As this piece of mucous membrane still contains a tolerably thick layer of sub-mucous areolar tissue, or of the so called vascular coat in which the gastric glands are in a manner imbedded, this cannot be at once employed in the preparation of the digestive fluid, since then a quantity of digested gelatinous substances would be mixed with it. This source of error cannot be entirely avoided, since in every mode of treatment, heterogeneous elements of tissue will be mixed with the glandular contents. In order, however, to obtain the latter in as pure a state as possible, the piece of mucous membrane, after lying for an hour or so in distilled water at the ordinary temperature, must be gently scraped with a blunt knife, or spatula. The pale grayish red, tenacious mucous, which adheres to the blade, must be placed in distilled water, and the mixture must be kept at the ordinary temperature for two or three hours, being frequently shaken in the interval. A little free acid must then be added, (hydrochloric, 1 p. ct., A. C,) and the mixture placed, for half an hour or an hour, in a hatching oven, at a temperature of 35° to 38° (R.) By this time the fluid will be found to have lost much of its viscidity, and it is now only slightly turbid; it will

pass readily through the filter in the form of a perfectly limpid fluid, with a scarcely perceptible yellow tint. A specimen of this fluid is presented, as also another portion of two ounces in which the entire white of an egg, coagulated, has been dissolved at a temperature of 100° F. in about six hours. A specimen is also presented of Boudault's starchy pepsin, and a nostrum called "*Houghton's pepsin*," in powder and syrup, which proves on examination to contain no true pepsin whatever.

ON THE THERAPEUTIC VALUE OF FOREIGN AND INDIGENOUS MEDICINAL PLANTS.

BY H. A. TILDEN.

The question relating to the comparative therapeutic value of foreign and indigenous or cultivated plants, assigned to me at the last meeting of your Association, I shall be able to report upon but partially this year.

To determine this question satisfactorily or conclusively, involves experiments and observations of two or more seasons; and, inasmuch as the sessions of the Association occur in advance of the season for the maturity of most medicinal plants, I am limited to such as have arrived at maturity, and can, from the limited time allowed, give only such portions of the several experiments concerning each as have been concluded.

No way presented itself of determining all the points involved in the question, inasmuch as the narcotic plants are perhaps the most important, or more particularly referred to in the question, but to make them, as a class, the subject of particular experiment and examination somewhat after the following plan: —

1st. An analysis of five specimens of Belladonna, Hyoscyamus, Aconite, Conium, and Digitalis; each specimen of the several different plants of different importation.

2d. The preparation of an extract of each specimen. The examination of each extract to determine the quantity of alkaloids, resins, etc., in each. Analysis of the ashes of the extracts of each plant, to determine the inorganic constituents of each; and comparison with the analysis of the plant, that we may infer the nature of the soil upon which they grew.

3d. An examination of extracts of the same plants of foreign manufacture, and comparison with those made here from the foreign plants.

4th. The analysis of the soil upon which those plants are grown here in general culture, before sowing, and also after the maturity of the plant.

5th. An analysis of the plants, at various periods of growth, to maturity.

6th. Treatment of each plant upon the same soil, with specific manures, as guano, nitrate of potassa, nitrate of soda, and also with a compound of the three.

7th. Analysis of the soil specifically manured, after the maturity of the plant.

The preparation of extracts of each plant, specifically treated, as well as of general culture. Analysis of each.

The organic analysis of very many of our indigenous medicinal plants, which are extensively cultivated, causing the plant, both cultivated and wild, to be collected once a month. Analysis of both, that we may determine at what period of growth the largest amount of medicinal principles are present.

Pursuant to the general plan, I caused different sections of a large field of Hyoscyamus, of the second year's growth, to be watered, one with a solution of nitrate of potassa; another with a solution of nitrate of soda; another with a solution of guano, until the plants had reached maturity, or the period of full bloom.

The plants watered exhibited marked difference in vigor or growth over other portions of the field; that portion upon which nitrate of potash was applied being of a much darker green color than that watered with nitrate of soda, and both much greener than that portion watered with solution of guano. The same difference in appearance is observable in a field of the same plant of the first year's growth.

At maturity the plants were collected, and submitted to a uniform process of crushing, expression, and subsequent maceration of the pulp in alcohol. The expressed juice and alcoholic solution were evaporated to the pilular consistence. A portion of each extract was dried, and treated by strong alcohol to dissolve the chlorophyle, alkaloid, and resinous principles; evaporated and treated with hot water to separate the resin and chlorophyle; the solution in hot water was boiled with oxide of lead to separate the coloring matter; filtered, and the filtrate evaporated to dryness, giving a nearly white substance, having marked alkaline reactions as follows, per centage in the extracts.

	Ordinary Cultivation.	Guano.	Nitrate Potassa.	Nitrate Soda.
Impure alkaline substance,	20.800	23.316	24.316	25.850
Coloring matter, - -	14.855	12.833	12.795	13.445

The alkaline principle, heated in a tube with potassa, disengaged ammonia largely, showing the presence of a large amount of nitrogen, indicating the presence of a vegetable alkaloid.

The precise character of this impure alkaloid, to which the plant undoubtedly, to a great extent, owes its activity as a medicinal agent, we are now unable to state, reserving this for further examination.

The disengagement of strong ammonia indicates the presence of an alkaloid, probably Hyoscyamia, as found by Brande.

The variation of this principle in the different extracts, as shown by the

table above, enables us to draw the inference fairly, that the different methods of treatment of the plant in cultivation produce a marked difference in its development in the plant; and we have no doubt, from the difference in the ammoniacal odor perceptible when each are tried with potash, that the pure Hyoscyamia will be found to vary in similar proportion.

The chlorophyle and resin were separated by dissolving the resin in alcohol of specific gravity of 90°; filtered, and the filtrate evaporated to dryness.

The residuum, insoluble in alcohol, was treated by cold water to determine the starch; the soluble portion evaporated to a syrupy consistence; the gum and albumen precipitated by alcohol.

The coloring matter contained in the aqueous part, together with the sugar, was not determined.

The result of the examination of this portion was as follows:—

	Ordinary Cultivation.	Guano.	Nitrate Potassa.	Nitrate Soda.
Solution in alcohol, . .	47.244	49.229	45.269	44.829
Alkaloid and Coloring Matter, . . .	35.433	36.453	37.162	39.325
Resin, ...	11.811	13.076	5.405	4.281
Chlorophyle, . . .			2.702	1.223
Starch, ...	2.482	2.561	1.992	1.999
Gum and albumen, . .	5.490	5.662	6.002	9.890

Another portion of each extract was dried and incinerated; the combustion was not carried far enough to produce entire destruction of the carbon. The ashes were then treated as follows:—

The carbonic acid gas was determined by weighing by hydrochloric acid in the apparatus of Will; the solution was then placed in a porcelain dish, and evaporated to dryness; then dissolved in water, acidulated with a little hydrochloric acid, and filtered, the residuum upon the filter giving carbon and silica. From the filtered liquor, all lime was precipitated by oxalate of ammonia and hydroclorate of ammonia, filtered, and the lime estimated in the state of sulphate of lime. The filtered liquor was evaporated to dryness, to expel the salt of ammonia previously added, and the residuum dissolved in water; to the solution was added ammonia, which precipitated the phosphate of magnesia, oxide of iron, and alumina. These were separated from each other by the usual known process. From the filtered solution free phosphoric acid was precipitated by sulphate ammoniaco magnesia.

Another portion of the ash was dissolved in water, acidulated with nitric acid, filtered, and divided into three portions. One portion was treated by nitrate of baryta, to determine the sulphuric acid, and by nitrate of silver, to determine the chlorine.

A second portion was treated by antimoniate of potash to determine the soda. A third, by chloride of platina, to determine the potassa; and the

nitric acid was estimated from another portion of the ash by Pelouse's process. The several extracts gave as follows:—

	Ordinary Cultivation.	Guano.	Nitrate Potassa.	Nitrate Soda.
Silica,	35.558	26.376	28.382	27.392
Phos. Lime,	35.153	38.815	32.161	33.022
Carb. do.,	4.723	4.440	8.129	7.144
Phos. Magnesia,	6.932	10.764	5.231	5.707
Carb. Potash,	7.950	8.106	11.407	5.761
Sulph. do.,	1.895	2.860	3.012	1.769
Chloride do.,	2.441	1.326	2.254	1.196
Nitrate do.,	1.509	1.500	4.299	1.196
Oxide of Iron,	1.509	1.818	1.332	1.191
Alumina,	0.923	.612	1.803	0.722
Nit. Soda,				3.391
Carb. do.,		1.800		10.084
Lost,	1.407	1.588	1.990	1.425
	100.	100.	100.	100.
Ash, per cent.	17.283	23.364	28.358	23.048
Total, Potassa,	13.795	13.792	20.972	9.822
" Soda,		1.800		13.475
Total both,	13.795	15.592	20.972	23.297
Total Phosphates,	42.085	49.597	37.392	38.379

It should be observed that the sections watered were sufficiently near as not to cause any variation in the character of the soil. It will be seen that potassa exists in the ordinary extract naturally, and is increased by special treatment nearly 50 per cent., while soda does not; and, by treatment with soda, the potassa is lessened from the natural proportion about 30 per cent. The nitrate of soda nearly equals the nitrate of potassa in the natural, and the nitrate soda and nitrate potassa, taken together, exceeding the nitrate of potassa in the one treated by it, leaving the inference that potash exists in the soil, and soda does not; that the latter should be used, so as to afford the largest amount of nitrates, and showing the disposition of the plant to take up both, unless it shall be shown by further investigations that the plant in which nitrate potash exists naturally, affords the largest amount of alkaloid, which is hardly probable.

This analysis explains the cause of the appearance of nitrate potash in crystals upon the surface of the inspissated extracts of hyoscyamus.

It is not difficult to determine the different matter of which a plant is composed; but it is quite another field of investigation to determine the manner in which these substances are produced, and follow the complicated processes which constitute vegetation. The multiplicity of operations continually going on in vegetation at the same time; the variety of substances formed out of

the same compound; the harmony, and skill, and certainty, which attend all the operations, are too wonderful to pass our observation, and too important to us, not to challenge thorough investigation.

The researches and discoveries of agricultural chemistry fully establish the fact, that plants require for their growth and perfect development, certain inorganic constituents, which are different for different classes of plants; and the object of our inquiry is to ascertain which inorganic constituents are indispensable for the growth of the cultivated narcotics, and perfect development of those principles upon which their value as medicinal agents depend.

The utility of alkalies in the formation of nitrates, or, indeed, in any form, cannot be doubted; nor can their utility in the formation of organic alkaloids in plants be considered a question.

Liebig says: "The existence of vegetable alkaloids in combination with organic acids, gives great weight to the opinion that alkaline bases in general are connected with the development of plants; and it remains to be determined by further experiment and analysis which salt is most efficient in the development of the peculiar alkaloid upon which the medicinal activity of each narcotic appears to almost entirely depend. Establish the true source of the active principle of other classes, and astertain by what process the development of resinous and natural principles likewise depends."

The investigation concerning cultivated narcotic plants, led me to an examination of our indigenous, medicinal plants in general use by the medical profession, with a view of determining to what particular principle or combinations their medicinal properties are due. Many have never been analyzed, while others have been partially so. As the process employed in the analysis of each would occupy too much time and space, I will give the general process of analysis pursued, it being varied somewhat by circumstances.

Most vegetable substances contain, to a greater or less extent, gum, albumen, extractive matter, coloring matter, starch, a principle peculiar to the article, resin soluble in alcohol, ether, or their combinations, tannic and gallic acid, sugar, soluble and insoluble salts.

The article to be examined is exhausted by cold water, the liquid evaporated to dryness. In this residuum may be found gum, albumen, peculiar principle, coloring matter, sugar, tannic and gallic acid, extractive matter, and soluble salts; to separate these, the residuum is treated by alcohol to dissolve the peculiar principle, coloring matter, tannic and gallic acid and sugar. The alcoholic solution is evaporated to dryness, and the residuum treated by ether, to dissolve the tannic and gallic acid, coloring matter, and peculiar principle, if present. If only tannic and gallic acid are dissolved by the ether, the tannin is weighed by a normal solution of gelatine, the difference giving the gallic acid. If coloring matter and a peculiar principle are dissolved, the liquid should be divided into two parts—in the one, weigh tannic acid by gelatine, in the other weigh coloring matter by animal black. From the filtrate, tannic and gallic acid are precipitated by oxide of lead, the filtrate

giving the peculiar principle; as that portion soluble in alcohol and insoluble in ether, may contain coloring matter, peculiar principle and sugar, the coloring matter is separated by animal charcoal, the sugar determined by tartrate of copper, the difference being the peculiar principle.

That portion of the residuum by cold water, insoluble by alcohol, is treated by hot water, the albumen collected upon a filter; the filtrate evaporated to a syrupy consistence; the gum precipitated by alcohol; the filtrate evaporated to dryness, weighed and calcined, the loss indicating the extractive matter, the residuum, salts soluble in cold water.

The same exhausted by cold water is exhausted by hot water, to dissolve the starch, coloring matter, peculiar principle and salts. To separate these, the coloring matter is determined by animal charcoal, the filtrate evaporated to dryness, then treated by alcohol to dissolve the peculiar principle, the insoluble residuum weighed and calcined, giving the salts soluble in hot water, the difference being the starch.

The same is treated by alcohol to dissolve the peculiar principle, coloring matter, resin, soluble in alcohol; alcohol and ether to separate them, evaporated the solution to dryness, treat by hot water to dissolve the coloring matter and peculiar principle, which are separated by animal charcoal; the residuum insoluble in hot water, treated by ether, gives the resin; soluble in alcohol and ether, the residuum insoluble in ether, is the resin soluble in alcohol.

The same is treated by ether to dissolve the resin, soluble in ether.

The same severally exhausted is burned, the ashes being the quantity of insoluble salts.

The ashes are analyzed by the process pursued on the analyses of the ashes of hyoscyamus.

It will be noticed in the analyses given, that occasionally gum and albumen are not separated; this occurs only when the percentage of albumen is very small, and its separation deemed unimportant.

RHATANY.		SWEET FERN. *Complonia Asplenifolia.* Collected in September.	
Organic Matter,	93.600	Organic Matters,	93.600
Inorganic Matter,	6.400	Inorganic Matters,	6.400
	100.000		100.000

Gum and Albumen,	1.257	Gum and Albumen,	3.669
Starch,	1.064	Starch,	3.085
Extractive Matter,	0.628	Extractive Matter,	1.309
Tannin,	3.964	Tannin, soluble in alcohol and water,	0.968
Sugar,	0.285	Tannin, insoluble do.,	4.857
Coloring Matter,	20.578	Sweet Principle,	11.517
Soluble Salts,	0.878	Chlorophyle,	6.271
Insoluble Salts,	5.522	Resin,	11.702
Ligneous, &c.	65.824	Sugar,	1.230
	100.000	Soluble Salts,	0.847
		Insoluble Salts,	5.553
		Ligneous, &c.,	48.992
			100.000

ST. JOHNSWORT.

Hypericum Perforatum.

Collected in July.

Organic Matters,	92.686
Inorganic Matters,	7.314
	100.000
Gum,	4.532
Albumen,	2.733
Starch,	1.508
Extractive Matter,	2.978
Tannin,	1.374
Bitter Principle,	4.714
Chlorophyle,	8.882
Resin,	2.097
Soluble Salts,	0.606
Insoluble Salts,	6.708
Ligneous,	63.868
	100.000

WITCH HAZEL BARK.

Hamamelis Virginica.

Collected in April.

Organic Matters,	94.515
Inorganic Matters,	5.485
	100.000
Gum,	3.714
Albumen,	0.857
Starch,	1.600
Sugar,	0.571
Extractive Matter,	3.485
Tannin,	5.714
Bitter Principle,	14.828
Resin,	2.457
Soluble Salts,	0.685
Insoluble Salts,	4.800
Ligneous, &c.,	61.289
	100.000

ERIGERON.

Organic Matters,	91.67
Inorganic Matters,	8.33
	100.00

LABRADOR TEA.

Organic Matters,	95.00
Inorganic Matters,	5.00
	100.00

Gum,	4.88	Gum,	4.33
Starch,	0.34	Starch,	0.30
Sugar,	2.08	Sugar,	2.29
Extractive Matter,	3.75	Extractive Matter,	1.02
Tannin,	2.13	Tannin,	2.36
Partic. Principle,	10.22	Principle Part.,	11.65
Chlorophyle,	5.67	Chlorophyle,	10.97
Oil,	2.30	Black Resin,	1.55
Soluble Salts,	3.92	Soluble Salts,	4.03
Insoluble Salts,	4.41	Insoluble Salts,	0.97
Ligneous,	60.31	Ligneous,	60.53
	100.00		100.00

HEMLOCK BARK.		QUEEN OF THE MEADOW.	
Organic Matters,	95.83	Organic Matters,	91.67
Inorganic Matters,	4.17	Inorganic Matters,	8.33
	100.00		100.00
Gum,	1.13	Gum,	5.29
Starch,	3.05	Starch,	1.77
Extract,	5.25	Sugar,	2.05
Coloring Matter,	16.78	Extractive Matter,	4.78
Tannin,	6.96	Tannin,	1.64
Soluble Salts,	3.89	Bitter Principle,	6.68
Insoluble Salts,	0.28	Particular do., ins. H. O.	8.96
Ligneux,	62.66	Chlorophyle,	6.66
		Soluble Salts,	5.30
	100.00	Insoluble Salts,	3.03
		Ligneous,	53.84
			100.00

SLIPPERY ELM BARK.

Organic Matters,	88.33
Inorganic Matters,	11.67
	100.00
Gum,	3.60
Mucilage,	10.43
Sugar,	4.80
Extractive Matter,	1.92
Tannin,	2.74
Matter Part.,	8.50
Oleo Resin,	3.06
Olea Resin,	3.06
Soluble Salts,	6.37
Insoluble Salts,	5.31
Ligneous,	53.27
	100.00

SWEET GALE.

Organic Matters,	95.43
Inorganic Matters,	4.57
	100.00
Gum and Albumen,	3.18
Starch,	1.03
Extractive Matter,	3.60
Tannin,	3.50
Sweet Principle,	8 74
Chlorophyle,	6.74
Soluble Salts,	3.46
Insoluble Salts,	1.12
Ligneous, &c.	68.63
	100.00

YELLOW DOCK.

Rumex Crispus.

Collected in October.

Organic Matters,	93.600
Inorganic Matters,	6.400
	100.000
Gum and Albumen,	3.394
Starch,	5.136
Sugar,	1.378
Extractive Matter,	2.637
Tannin,	3.307
Yellow Principle, bitter,	9.942
Yellow Principle, sweet, becomes red by concentration,	6.628
Resin, soluble in ether,	2.285
Resin, soluble in alcohol,	3.778
Soluble Salts,	3.341
Insoluble Salts,	3.059
Ligneous, &c.	55.115
	100.000

BAYBERRY.

Myrica Cerifera.

	East.	South.
Organic Matters,	95.429	98.058
Inorganic Matters,	4.571	1.942
	100.000	100.000

Gum,	2.114	2.914
Albumen,	3.371	2.457
Starch,	3.885	2.800
Sugar,	0.457	0.742
Extractive Matter,	1.942	2.057
Coloring Matter,	2.635	5.428
Tannin,	2.139	0.642
Gallic Acid,	5.714	2.142
Particular Principle,	0.985	1.278
Resin,	7.921	5.171
Soluble Salts,	0.800	1.771
Insoluble Salts,	3.771	0.171
Ligneous,	64.266	74.427
	100.000	100.000

MANDRAKE ROOT.

	Spring. Collected in April.	Autumn, Collected in October.
Organic Matter,	90.857	90.857
Inorganic Matter,	9.143	9.143
	100.000	100.000
Gum and Albumen,	8.857	6.854
Starch,	6.057	8.121
Extractive Matter,	7.571	3.897
Bitter Principle,	11.828	10.882
Resin, soluble in Alcohol and Ether,	2.857	5.117
Resin, soluble in Alcohol, and insoluble in ether,	2.400	0.571
Soluble Salts,	1.072	2.490
Insoluble Salts,	8.070	6.652
Ligneous, &c.	51.288	55.416
	100.000	100.000

OAKS.

Collected in the Spring of the year.

	Black Quercus Tinctoria.	White Quercus Tinctoria.	Red Quercus Tinctoria.
Organic Matters,	90.108	85.370	90.931
Inorganic Matters,	9.892	14.630	9.069
	100.000	100.000	100.000

Gum and Albumen,	1.140	3.662	1.485
Starch,	1.611	0.756	1.595
Sugar,	0.690		
Extractive Matter,	0.379	1.307	0.445
Bitter Principle,	2.022	5.019	3.318
Resin,	2.960	1.749	4.571
Tannin,	4.804	3.869	3.537
Soluble Salts,	1.284	1.889	0.291
Insoluble Salts,	8.608	12.738	8.778
Ligneous, &c.	76.502	69.011	75.980
	100.000	100.000	100.000

AVENS ROOT.

Geum Rivale.

Collected in October.

Organic Matters,	89.029
Inorganic Matters,	10.971
	100.000
Gum and Albumen,	5.147
Bassorin,	9.200
Starch,	3.424
Extractive Matter,	7.629
Tannin, soluble in Water and Alcohol,	5.861
Tannin, insoluble, do., do.	2.981
Resin,	2.285
Soluble Salts,	1.063
Insoluble Salts,	9.908
Ligneous, &c.	50.008
	100.000

BLACK ALDER BARK.

Prinus Verticillatus.

Peeled in Spring.

Organic Matters,	90.858
Inorganic Matters,	9.142
	100.000
Gum and Albumen,	3.155
Sugar,	0.155
Extractive Matter,	1.441
Tannin,	4.742
Bitter Principle,	5.782
Resin, soluble in Ether,	0.342
Resin, soluble in Alcohol,	2.014
Soluble Salts,	1.988
Insoluble Salts,	7.154
Ligneous, &c.	73.227
	100.000

BEECH DROPS.

Orobanche Virginiana.

Collected in August.

Organic Matters,	95.428
Inorganic Matters,	4.572
	100.000

BLACKBERRY ROOT.

Rubus Villosus.

Collected before vegetation had begun in April.

Organic Matters,	90.144
Inorganic Matters,	9.856
	100.000

Gum and Albumen,	4.013	Gum and Albumen,	3.298
Starch,	3.760	Extractive Matter,	2.121
Extractive Matter,	4.834	Tannin,	1.485
Tannin,	6.772	Bitter Principle,	3.741
Bitter Principle,	12.838	Resin, soluble in Alcohol,	1.485
Soluble Salts,	2.500	Resin, soluble in Ether,	0.685
Insoluble Salts,	2.072	Soluble Salts,	1.315
Ligneous, &c.	63.211	Insoluble Salts,	8.539
	100.000	Ligneous, &c.	77.331
			100.000

AGRIMONY.

Organic Matters,	94.16
Inorganic Matters,	4.84
	100.00
Gum,	5.28
Starch,	1.77
Sugar,	1.38
Matter Part.,	11.25
Tannin,	2.74
Chlorophyle,	2.26
Resin Bitter,	2.51
Soluble Salts,	5.70
Insoluble Salts,	.76
Ligneous,	61.65
	100.00

COTTON BARK.

Organic Matters,	90.857
Inorganic Matters,	9.143
	100.000
Gum,	1.885
Albumen,	1.542
Sugar,	1.442
Extractive Matter,	2.400
Principle Part.,	4.157
Resin,	3.771
Soluble Salts,	1.064
Insoluble Salts,	8.079
Ligneous, &c.	75.960
	100.000

BARBERRY BARK.

Organic Matters,	95.00
Inorganic Matters,	5.00
	100.00
Gum,	2.67
Starch,	0.30
Extractive Matter,	5.86
Tannin,	2.64
Bitter Prin. Part.,	13.11
Coloring Matter, Yellow,	8.57
Resin, soluble in Alcohol,	6.24
Resin, soluble in Ether,	1.95
Soluble Salts,	4.19
Insoluble Salts,	.81
Ligneous,	53.76
	100.00

COTTON ROOT.

Organic Matters,	96.386
Inorganic Matters,	3.614
	100.000
Gum,	2.171
Albumen,	0.314
Starch,	0.417
Sugar,	0.200
Extractive Matter,	0.200
Part. Principle, mix to an acid,	1.875
Resin,	0.300
Fixed Oil,	1.185
Soluble Salts,	.329
Insoluble Salts,	3.285
Ligneous,	89.724
	100.000

BOXWOOD BARK.

Cornus Florida.

Collected in April.

Organic Matters,	87.486
Inorganic Matters,	12.514
	100.000
Gum and Albumen,	1.485
Starch,	0.800
Sugar,	0.057
Extractive Matter,	3.314
Coloring Matter,	0.114
Tannin,	1,157
Bitter Principle,	3.400
Bitter Principle, Crhys.,	0.171
Resin,	2.985
Soluble Salts,	1.350
Insoluble Salts,	11.164
Ligneous, &c.	74.003
	100.000

CULVER'S ROOT.

Leptandria Virginica.

Collected in October.

Organic Matters,	96.343
Inorganic Matters,	3.657
	100.000
Gum and Albumen,	2.514
Starch,	3.085
Sugar,	0.242
Extractive Matter,	2.000
Coloring Matter,	1.714
Tannin,	0.571
Bitter Principle, soluble in Water,	7.428
Resin,	3.142
Soluble Salts,	1.143
Insoluble Salts,	2.514
Ligneous, &c.	65.647
	100.000

BUGLE WEED.

Lycopus Virginicus.

Collected in June.

Organic Matters,	98 172
Inorganic Matters,	1.828
	100.000
Gum and Albumen,	3.542
Starch,	2.457
Sugar,	1.714
Extractive Matter,	3.314
Tannin,	0.571
Bitter Principle, soluble in Ether,	0.342
Bitter Principle, insoluble do.	9.442
Chlorophyle,	3.142
Soluble Salts,	0.371
Insoluble Salts,	1.457
Ligneous,	73.648
	100.000

PRINCES' PINE.

Chimaphila Umbellata.

Collected in May.

Organic Matters,	92.686
Inorganic Matters,	7.314
	100.000
Gum and Albumen,	3.286
Starch,	0.484
Sugar,	2.589
Extractive Matter,	4.998
Tannin,	4.961
Bitter Principle,	14.295
Chlorophyle,	6.342
Soluble Salts,	1.184
Insoluble Salts,	6.130
Ligneous, &c.	55.731
	100.000

VOLUNTEER REPORTS

ON

SCIENTIFIC SUBJECTS AND ESSAYS.

ON THE BEHAVIOR OF ESSENTIAL OILS TO IODINE AND BROMINE.

BY JOHN M. MAISCH.

At last year's meeting, I handed to the Association a paper on the detection of adulterations of volatile oils, in which I gave the results of my investigations of the most important tests recommended for this purpose. I had omitted to report on iodine, as my experiments had not proceeded far enough to warrant me in laying them before the Association. The subject has been followed up by me, and brought to a state sufficiently complete to admit of being reported upon. At the same time, I have the pleasure to notice the application of iodine in a new form as a test for essential oils, and also a new test, bromine, which, hitherto, has not been employed for such a purpose.

The reaction of iodine with the essential oils has first been noticed and recommended as a test by Dr. Tuchen, a German apothecary; it has subsequently been studied by Winckler, Beschoener, Flashaff, Walker, and others, and particularly by G. H. Zeller, who has laid down his classical researches on the properties of the essential oils in his important work, "Studien über die ætherischen Oele." He has also first directed attention to the importance of employing certain quantities and proportions of the oil and of iodine, so as to make the examinations under conditions as nearly alike as possible. His suggestions were to place five or six drops, according to their size, of the oil in a watch crystal and add to it two grains of iodine, previously fused and rubbed into powder; the iodine is to be added at one time and right into the middle of the oil; after the reaction has ceased, the oil is stirred with a glass rod, and the nature of the mixture is noted. If oils of a thicker consistency are tested, Zeller has been in the habit to heat slightly the crystal containing the oil. In all the following experiments, I have omitted this precaution of Zeller, because undoubtedly the reaction between the oil and iodine is increased by the application of heat, while it appears to me essential for the detection of adulterations by cheaper oils, to be familiar with their behavior under alike circumstances and conditions.

Acting under this conviction, I have taken the precaution to make the experiments at a medium temperature, selecting the medium heat of summer, ranging from 70 to 85° F.; but few experiments were performed at a higher temperature, and they were verified or corrected at the lower one mentioned. By adopting these limits, I thought to confine the influence of heat within practical bounds, which may easily be observed in all cases without any great inconvenience.

The difference in the reaction of iodine with volatile oils, suggested to me the idea of employing bromine, which, while in its chemical properties, closely resembling iodine, has for this purpose the advantage of being in a liquid state, so that a more energetic and complete action was to be expected from it. This expectation was verified by experiment, but I soon found that it was so violent, as to most likely exclude the possibility of noticing a difference occasioned by the presence of other oils. The behavior of a few of the oils to pure bromine will be noticed under their respective heads; it was employed by allowing a drop of bromine to fall in the centre of five or six drops of the volatile oil, placed in a watch crystal. By the violent reaction which was shown by all, I was induced to think of a diluent for the reagent and found ether to answer this purpose best.

After some trial experiments, I have selected a solution of one measure of bromine in about five measures of officinal ether; with a solution of this strength the reaction does not proceed too quick, while the changes in color and consistency may be easily observed. An ethereal solution of bromine is decomposed spontaneously; it is therefore best to prepare it extemporaneously. While mixing the two liquids, some caution is necessary to prevent their becoming heated, as decomposition would take place, and so much of both liquids volatilized that the resulting mixture would be of uncertain strength. It is therefore best to immerse the vial containing the ether in cool water, and for each fluid drachm of this solvent, add fifteen drops of bromine to it. To five or six drops of an essential oil placed in a watch crystal, five drops of the ethereal solution of bromine are added.

In using this test, the evaporation of ether which takes place from the crystal, absorbs so much heat, that the mixture is kept cool, and no generation of surplus heat can be expected. All the articles used in this examination are of a volatile nature, and their evaporation is favored by a constant change of air; it is therefore requisite to prevent this, and make the experiments in a place excluded from draughts.

The employment of an ethereal solution of bromine suggested the use of iodine in a state of solution; its ethereal solution appeared to have many advantages over the concentrated spirituous tincture, owing to the solubility of oils in ether, by which property a more intimate connection and a quick and sure reaction would be promoted. I have employed a concentrated ethereal tincture of iodine, which was prepared by adding to officinal ether,

sufficient iodine to leave some of it behind undissolved. For the same quantity of essential oils as in the above mentioned tests, three drops of the ethereal tincture were added, in a place protected against draughts of air. The drops of this ethereal solution were larger than was anticipated; but I am not prepared to say whether their size is to be ascribed to the presence of iodine, or chiefly to the peculiar form of the lip of the vial from which they were dropped.

When testing with the ethereal solution of bromine, a peculiar phenomenon had been observed, consisting of a spreading out of the mixture, up the sides of the watch crystals; this was referred to the evaporation of the ethereal liquid, and no farther notice was taken of it; but while experimenting with the ethereal tincture of iodine, and noticing the same behavior, there was a marked difference observed in this "spreading" from the presence of some oils, and attention was directed to it. The "spreading" consists in the uniform working up on the side of the crystal, towards the circumference of a larger or smaller quantity of the mixture, with a flapping or wavy motion, in some instances up to the very edge of the vessel; and then returning to the bottom again by forming streams from the upper margin down. Some oils show but little of this spreading motion, but mix quietly with the ethereal liquid, being acted on by the iodine and exhaling the ether; others, again, while they are miscible with little disturbance, subsequently commence to spread, gradually running over the edge of the vessel, leaving but little oil behind; sometimes the commotion of the liquids is such as to resemble a brisk effervescence or the phenomenon of boiling.

While I at first supposed it to be all owing to the evaporation of ether, I am now inclined to think that the composition of the various oils exerts its influence on this activity, while a neutral behavior in this respect of other oils can scarcely be founded on any grounds except peculiarity in their composition. I have in this connection to draw attention to a phenomenon, which, it seems to me, may be referred to the same reason. I refer to the peculiar motion, imparted by certain volatile oils, to a solution of bichromate of potassa mixed with sulphuric acid, which was described by Dr. J. T. Plummer, of Richmond, Ind., in the American Journal of Pharmacy, vol. xxviii., page 197.

I regret that my attention had not been drawn to the difference in this behavior at an earlier season, so as to allow me sufficient time to report all the experiments with the ethereal solutions, with a view of observing the particularities of the various oils in this respect. My notes on this subject are, for the reasons above named, rather meagre; but I give them as they were put down at the time, reserving for future observations, to correct and enlarge them, if the matter should turn out to be really of interest and importance, in recognizing the volatile oils.

Upon the behavior of the volatile oils towards iodine, various classifications have been based; Tuchen classified them into fulminating oils, in oils which dissolve iodine completely, and such which dissolve it but imperfectly. Zeller,

from his careful investigations, divided them into five classes, and each of them again in various subdivisions; they are as follows: —

I. Fulminating, or decomposing with detonation, with much heat, and the generation of violet and yellowish red vapors;

(*a.*) Quick and violent fulmination, with mostly violet vapors. Oleum terebinthinæ, sabinæ, juniperi, macidis;

(*b.*) Brisk, but less quick and violent fulmination, with principally yellowish red vapors. Oleum neroli, bergami, limonis, aurantii, lavandulæ, spicæ, origani, vulganis, petroselini, herbæ, copaivæ.

II. Quiet and noiseless evolution of yellowish red or gray vapors, accompanied with a rise of temperature;

(*a.*) Many yellowish red vapors, considerable rise of temperature. Oleum cardamomi, melissæ, majoranæ, asari Europe;

(*b.*) Few yellowish red vapors, with perceptible heat. Oleum rosmarini, serpylli, hyssopi, anisi vulgaris;

(*c.*) Few yellowish red vapors, little heat. Oleum thymi vulgaris, salviæ, millefolii, cubebæ, cejeputi, menthæ crispæ, matricariæ, arnicæ flor, anethi, foeniculi, anisi stellati, carui;

(*d.*) Few greyish yellow vapors, little heat. Oleum calami, valerianæ;

(*e.*) Few grey vapors, little heat. Oleum nigellæ, cumini.

III. Solution without vapors, but with a rise of temperature;

(*a.*) Considerable heat. Oleum cinnamomi Ceylon;

(*b.*) Little and very little heat. Oleum cascarillæ, cydoniæ, absinthii, cinnamomi Chin, caryopylli.

IV. Solution without vapors and heat;

(*a.*) Forming a homogeneous solution. Oleum cynæ, tanaceti, menthæ piper, origani cretici, sassafras, rutæ, arnicæ radicis, petroselini seminis, sinapis;

(*b.*) Forming two strata. Oleum asphalti, ceræ, succini.

V. Partial and very sparing solution without reaction. Oleum amygdalæ amaræ, rosæ, petræ.

The description of the color as it is affected under the influence of iodine, is a matter of some difficulty; it occurs very often that in the first or a subsequent stage of the reaction, a color is produced which strongly reminds one of the color of an iodine solution, but at the same time so different as to be easily noticed. From the similarity of appearance it was suggested to compare them with the color of a solution of iodine, and wherever in the following observations, the expression "iodine color" has been used, it is understood to apply to a color resembling that of tincture of iodine, diluted with alcohol to about four times its volume. From this explanation, other expressions, such as pale, deep, yellowish, reddish, &c., iodine color will be readily understood.

I have to remark yet, that the oils which I have used in these experiments, were mostly obtained from reliable sources; in some instances the commercial

articles were used, in which case I took pains to examine them first in other ways, so as to be assured of their freedom from adulterations. The physical properties of each of the oils examined by me, will be briefly stated.

In proceeding to state the reactions as they belong to the various oils, I thought proper to give also the observations of Zeller, which in all cases will be distinguished by an affixed Z.

Reactions of the volatile oils with bromine and iodine.

I. The Carbohydrogens. — *Oleum Copaibæ.* Thin, colorless.

Iodine. — Faint fulmination, with yellowish red vapors and considerable heat, developed on stirring. After the reaction the residue consists of a reddish brown iodine compound, adhering like resin to the glass, and a syrupy liquid of a brown color, changing into greenish by exposure to the air. Z.

The reaction is not violent; the sediment has a blackish brown color with a margin of yellowish brown, not iodine color, the oil is yellowish, the whole miscible without separating.

Ether sol. iodine. — Some spreading, mixes with little sediment and a brown yellow color; after six hours, greenish brown, little thickened, scarcely any sediment.

Ether sol. bromine. — The reaction is accompanied by white vapors and a green color; after the reaction the sediment is brown, the oil brownish green.

Oleum Cubebæ. — Oily consistence, limpid, a faint greenish tinge.

Iodine. — Little heat, radiating motion, few grey and reddish vapors; at first the oil is violet; after mixing, the color is changed to yellowish brown, and the residue has the consistence of honey, and a somewhat modified odor. Z.

Brisk reaction, without fulmination; yellow vapors; the color is blue, afterwards bluish green; after the reaction, the sediment has a nearly black color, with a blueish green margin, around which the oil is of a lemon color, growing fainter towards the edge. The whole is miscible to a dark greenish liquid, from which the sediment subsides again, leaving the oil of a greenish lemon color.

Eth. sol. iodine. — Little spreading. The iodine color quickly changes to yellowish and greenish brown, then greenish black. After six hours the oil is considerably thicker and of a black color, which in very thin layers appears blackish green.

Eth. sol. bromine produces white vapors and a violet color, growing deeper in a short time; after the reaction the sediment is of a deep violet, almost black; the supernatant oil of a dark greenish blue.

Oleum juniperi baccæ. — Thin, limpid.

Iodine. — The oil fulminates quickly, with evolution of violet vapors and much heat, particularly on stirring. The residue is an oleoresinous, blackish brown mass, and some scarcely colored oil, the whole miscible with some diffi-

culty to a greenish brown, afterwards olive green liquid. The oil from unripe berries fulminates more violently and gives out with the iodine vapors, also many of a grey color. With old oil the reaction is of shorter duration and shows less heat, the residue is easier miscible and has then a reddish yellow-brown color, and the consistence of an extract. In all cases the residue has a balsamic little modified odor. Z.

By the reaction much heat is produced and many grey, but few violet vapors; the residue consists of a dark brown resin and an olive green liquid, which after a while are miscible to a half syrupy greenish red-brown liquid; the odor is scarcely modified.

Ether sol. iodine. — Some effervescence and spreading; the oil assumes a greenish yellow color, while an iodine colored resin-like mass collects on the bottom, which after mixing separates again; the oil has now a light iodine color, afterwards a brownish olive-green.

Ether sol. bromine mixes with the oil with a radiating motion; the color is brownish yellow, with streaks of brown, which turn to a brownish purple, afterwards purplish black; the supernatant oil is now olive green.

Bromine produces a very violent detonation and many grey vapors; the residue by one drop of bromine is thin, pale yellow; by two drops, oily, dark olive green; by four drops, thick syrupy reddish brown; the odor of the first is nearly unaltered, of the others more modified, but plainly like juniper.

Oleum Juniperi. — Yellow, very old, resinified, thick, but said to be unadulterated.

Iodine. — Slow reaction, little heat, no vapors; the residue consists of a brownish black resin and a brownish yellow liquid; after some time they are miscible to a dark brown oily liquid; the odor of which is juniperous, balsamic, reminding of urpentine.

Ether sol. iodine. — Some irregular spreading out, homogeneous liquid of deep iodine color, spreading after a while a thinner and lighter liquid; the whole gradually congeals into a reddish-brown resinous mass of the consistency of butter.

Bromine. — Fulmination with very few grey vapors; the residue is a brownish red resin and a yellow liquid having a greenish tint, the whole being miscible to a wine yellow oil; the odor is little altered, scarcely terebinthinate.

Oleum Petræ. — Colorless, very thin and mobile.

Iodine. — Not soluble, but gradually altering into a tough, dark yellow-brown, resin-like mass, which firmly adheres to the glass, the oil assuming a pale carmine color, which, in contact with the air, gradually turns brown. Z.

Very little soluble, without any visible reaction to a pale, gradually deeper carmine colored liquid; otherwise the oil is unaltered.

Ether sol. iodine produces some spreading of a small quantity of a carmine colored oil, with a larger portion of a nearly black liquid; after this reaction

has subsided, fine spots of a brown colored mass remain upon the sides of the vessel, a black oily sediment separates, while the supernatant transparent liquid is of a rose color. After six hours, part of the oil has worked itself over the edges of the vessel, leaving a little of a deep carmine colored liquid behind, and a black mass, which in very thin layers appears of a brown carmine red.

Bromine. — No reaction by three drops; the bromine collects on the bottom, dissolves slightly in the oil, coloring it yellowish red and constantly evaporating from the surface with a slight effervescent motion; six hours afterwards, the whole mixture has evaporated, leaving no residue, and the odor of the oil unaltered.

Ether sol. bromine sinks to the bottom, leaving the supernatant oil scarcely tinged with yellow.

Oleum Sabinæ. — Thin, colorless.

Iodine. — The oil distilled from the leaves and the tops of the branches, showed with iodine the highest temperature, fulminated quickly and violently, and left a reddish brown residue, of the consistence of honey, easily miscible with the undecomposed oil. Another heavier oil was after the reaction with iodine, thinner and olive green. Z.

Brisk detonation, with violet and grey vapors; the residue consisted of a little greenish brown sediment and a blackish green clear liquid, which were readily miscible.

Ether sol. iodine yields a light reddish yellow liquid and a heavier iodine colored oily fluid; the two are miscible, though not very readily.

Ether sol. bromine. — The mixture turns instantly colorless with a hissing noise; a lower stratum is separated, which has a whitish color changing to dark brown, while the upper liquid, at first transparent and colorless, is rendered slightly milky.

Oleum Succini. — Thin, and nearly colorless.

Iodine. — Without visible reaction, the dissolving iodine combines to a dark, thick liquid, which after some time mixes but imperfectly with the thinner yellowish brown oil. Z.

It is partly dissolved with little motion to a yellowish brown liquid scarcely miscible with the thicker lower stratum.

Ether sol. iodine. — Without any reaction, two strata are formed, the upper one of which is thin and yellow, the lower one thicker and of iodine color. After six hours, the greater part of it has been working itself out of the vessel, leaving a thin yellow liquid behind.

Bromine. — Violent fulmination, most of the oil is thrown out of the dish.

Ether sol. bromine generates some white fumes; the oil remains nearly unaltered in color, while the lower liquid soon takes a purplish brown color.

Oleum Terebinthinæ. — Thin, colorless, free of resin.

Iodine fulminates with energy evolving violet vapors: the residue consists of undecomposed, brown-red oil, and a blackish brown iodine compound, which after some time is miscible to a soft dark brown mass, which in contact with the air turns greenish brown, and has a disagreeable empyreumatic terebinthinate odor. Z.

Violent fulmination, with purple colored vapors; the oil has a brownish carmine color, turning to red brown; around the dark sediment some greenish colored liquid is observed, the whole after a while readily miscible; odor terebinthinate, empyreumatic.

Ether sol. iodine settles to the bottom without any visible reaction, the oil gradually assuming a brown carmine color. After six hours, it has been spreading out of the watch crystal, leaving a light brown resinous mass behind, of a peculiar resinous empyreumatic odor.

Bromine causes a most violent fulmination, with an abundance of white vapors; much of the oil is thown away, the remaining oil is colorless and unaffected.

Ether sol. bromine evolves white vapors; during the reaction the whole turns white; the sediment then assumes a light yellowish color, leaving the oil colorless; the two strata are not miscible.

II. The Oxygenated Oils.

Oleum Absinthii. — Brown, thick, old.

Iodine. — The action of iodine varies considerably with the age of the oil or of the herb from which it has been produced. Fresh and well kept oil is rendered of a grass green color, with little heat, but otherwise without reaction; older oils may show a radiating motion, with iodine vapors and a tough extractive residue; or detonation, with evolution of violent vapors, and leaving a brown syrupy residue. Z.

It dissolves with radiating motion to a deep brown syrupy liquid.

Ether sol. iodine mixes with the oil to a dark olive brown liquid.

Ether sol. bromine yields a blackish brown mixture without any reaction.

Oleum Anisi. — Transparent, colorless.

Iodine. — The oil moderately heated, gives off reddish and white vapors; by stirring, the whole hardens quickly to a resin-like mass, which on cooling is fragile. Z.

It dissolves slowly in the cold oil with some radiating motion and scarcely any vapors; the particles of iodine adhere together and the residue is an iodine colored liquid. But if the reaction has been facilitated by quick and continued agitation or slight heating, the whole soon congeals to a brittle brown mass.

Ether sol. iodine causes little spreading, is miscible to an iodine colored liquid, and in a few minutes congeals to a butyraceous mass, which in six hours is still sticky and has turned to a deep coffee brown; in twelve hours the mass is hard and brittle.

Ether sol. bromine produces a quick radiating motion; the color is white, afterwards colorless; more bromine alters it to a light purplish brown.

Oleum Anisi stellati. — Thin, pale yellow.

Iodine generates without effervescence, some bluish red vapors and little heat; on stirring the mixture, it soon hardens to a resin-like, brittle mass. Z.

There is scarcely any difference in its behavor to iodine from that of oleum anisi.

Ether sol. iodine. — Perfect solution of iodine color, without spreading; it thickens in a few minutes to a butyaceous mass, which after several hours is hard and brittle.

Bromine. — Whizzing noise, white fumes, effervescence; the residue consists of a reddish resinous body, and a liquid of a greenish yellow color, which is somewhat thicker than the original oil.

Ether sol. bromine. — Quick radiating motion; the oil turns white immediotely, and remains of that color; more bromine colors it yellowish red, it evaporates in two layers, the upper one of which is lighter colored, somewhat turbid, and turns to a purplish color.

Oleum Aurantii Corticis. — Pale yellow, thin, about a year old.

Iodine. — The fresh oil shows brisk fulmination, less than oil of neroli. A thick, dark iodine compound is separated from the brown red liquid residue, the whole miscible to a not homogeneous fluid. Beschorner observed no heat or fulmination, but a radiating motion and brown red solution, properties which probably belong to oil distilled from the old dry peel. Z.

Some radiating motion and no vapors were observed; the oil is of a reddish yellow, miscible with the iodine sediment to an iodine colored solution.

Ether sol. iodine. — Spreading; forms two liquids, the upper one pale yellowish, the lower one thick, reddish brown, almost black; in six hours, the whole was altered into a dark pitchy mass of an acidulous odor.

Bromine. — The reaction is so violent that most of the oil is thrown out of the vessel, and many white fumes are given off, with the evolution of much heat; the oil left behind, assumes a brownish color.

Ether sol. bromine generates some white vapors; the oil is at first left uncolored, while a brisk reaction is going on; it then assumes a bright yellow color, in a short time yellowish brown stripes appear, forming into a slowly rotating crescent, which leaves a brown color behind; the rotation ceases as soon as the color has become a uniform deep brown; the supernatant oil is now of a pale brown color and perfectly transparent.

The rotating crescent appears to be a characteristic reaction of oil of orange peel, with ethereal solution of bromine, and appeared in all the repetitions of this experiment. I have tried to find out how far it is influenced by the presence of other similar oils, and will here state the results.

Oil of bergamot four parts, oil of orange one part. — The ethereal solution of bromine has but little radiating motion; a small crescent appears and disappears alternately; after the reaction, the color is of a deep reddish brown, the supernatant fluid is whitish, turbid, afterwards clear.

Oil of lemon four parts, oil of orange one part. — Around the ethereal solution of bromine in the centre of the oil, a brisk reaction takes place, and a bright yellow color is produced, in which soon a small crescent is formed, running together to a brown spot; the whole sedimentary liquid assumes a yellowish brown color; the supernatant is milky and brownish white.

Oleum Bergami. — Thin, greenish yellow.

Iodine. — Brisk fulmination with effervescence, violet and yellow-red vapors and much heat, more than oil of orange. The homogeneous residue is of a yellowish brown color, an extractive consistence and of an acidulous balsamic odor. Z.

Vivid reaction, with heat, detonation and the evolution of purple and yellowish fumes; the residue consists of a black extract and a yellow oil, which are readily miscible to a dark, nearly unctuous liquid; the odor is acetous, aromatic.

Eth. sol. iodine. — Some effervescence; the homogeneal thin liquid is of a bright yellow iodine color, gradually deepening; in six hours, a dark brown pitchy mass remains behind.

Bromine. — Vigorous reaction, with detonation, heat, and white fumes; the residue is reddish yellow, the supernatant liquid yellow, and both are miscible to a greenish yellow oil; the odor is little altered and free of acetosity.

Eth. sol. bromine. — The reaction takes place by an energetic working from the centre towards the circumference in one or two directions; the color is greenish brown yellow, at the conclusion of the reaction reddish brown yellow; the supernatant liquid is slighly cloudy, whitish, subsequently limpid. (See also Oleum limonis.)

Oleum Cajeputi. — Thin, pale yellowish green.

Iodine dissolves slowly in the crude oil without visible reaction, the residue appears curdled. Another sample showed radiating motion, with few reddish fumes and little heat, and a more coherent residue. The rectified oil evolves yellowish red vapors, little heat, and leaves as residue a greenish brown curd, by agitation adhering to a crumbling mass, which appears to be characteristic for this oil. Z.

It produced a radiating movement, without vapors; the oil has an iodine color, and the sediment by agitation runs together into a crummy resinous mass.

Eth. sol. iodine. — Spreading, mixing to an iodine colored liquid; after six hours the liquid had partly overrun the edges of the vessel, leaving a crummy mass, of a nearly crystalline appearance, together with very little fluid of a yellow iodine color.

Eth. sol. bromine sinks to the bottom; the supernatant liquid is scarcely colored; the reaction is manifested by the appearance of minute greenish, and blackish green drops; they are with difficulty miscible by stirring, but separate again as a more homogeneous heavy liquid.

Oleum Calami. — Thickish, pale yellow.

Iodine dissolves in the heaviest oil, without vapors, a tough extractive mass; oil of medium specific gravity evolves a few vapors; the lightest oil shows a higher temperature and more green and yellow vapors; the residue of the last two was softer. Z.

It dissolves slowly to a thick, nearly black liquid, some of the iodine-adhering firmly to the glass.

Eth. sol. iodine mixes quickly to an iodine colored liquid, with a darker sediment.

Eth. sol. bromine works from the centre towards the circumference, one-half of the mixture being of a yolk yellow color, the other half of a reddish brown; the first passes through various shades into a brownish green supernatant liquid; the last changes to a rose color, and passing through reddish brown to deep black brown, constitutes the sedimentary fluid.

Oleum Carui. — Thin, colorless.

Iodine dissolves without commotion or vapors in the heaviest oil, (spec. gr. .96;) by the oil of .91 and .92 prepared from recently dried seed, few grey and violet vapors are evolved; oil 10 years old of .939 sp. gr. produces a lively disengagement of violet vapors and some heat; oil of .947 sp. gr., distilled from old seed, is fulminating with violent evolution of vapors. The reddish brown residue of all the various oils shows little thickening and have but little of a caraway odor, but a peculiar acidulous balsamic smell. Iodine appears to be not a reliable test for oil of caraway. Z.

It dissolves with a radiating motion and little heat to a yellowish red transparent liquid, which is readily miscible with the darker and thicker sediment.

Eth. sol. iodine.—Brisk effervescence by the first drop, the second and third drops mix quietly with the oil to a thin homogeneous fluid of idione color, with scarcely any precipitate.

Eth. sol. bromine shows little reaction; a circular yellowish brown color is produced; the supernatant liquid nearly colorless and perfectly transparent, afterwards light brown and cloudy.

Oleum Carui. — Yellow, old, thick, oily.

Iodine. — There was some reaction, but no perceptible heat and no vapors; the residue was a yellowish brown liquid and a dark brown extractive mass, which were readily miscible. Odor balsamic, acidulous.

Eth. sol. iodine. — Some irregular motion towards the circumference; the homogeneous thick liquid has a concentrated iodine color, a small quantity of a lighter liquid separates, which afterwards reunites to a uniform thick balsamic mass.

Bromine produces a hissing noise on coming in contact with the oil, and evolves some grey vapors; the mixture consists now of a deep reddish brown sediment and a light yellow colored oil, which are readily miscible to a yellow oil with but a faintly brown tint. Odor little modified.

Ether. sol. bromine appears not to readily mix at first, but is for some time retained in a semicircle of yellowish brown, afterwards red brown; the supernatant oil is light brown and slightly turbid.

Oleum Caryophylli. — Fresh specimen, pale yellowish brown.

Iodine dissolved slowly and quietly to a greenish yellow brown mass of honey consistence and unaltered odor; the India oil dissolves it still slower to a clear, viscid, yellowish red liquid. Z.

Slow solution, at first yellow, afterwards reddish, thick odor unaltered.

Ether. sol. iodine mixes uniformly to a yellowish red, iodine colored liquid.

Ether. sol. bromine.—The yellow color of the mixture quickly disappears, by changing to greenish, greyish green: an aqueous liquid (from the ether) collects on the surface and is nearly colorless; the oily heavy stratum alters its color to a pale greyish black, then brownish black.

Oleum Cinnamomi Chinensis. — Fresh specimen, brownish yellow.

Iodine dissolves quickly in the oil of Ceylon cinnamon, with little radiating motion and much heat, to a tenacious greenish yellow brown mass of cinnamon odor. In the oil of Chinese cinnamon, iodine dissolves slowly without any visible motion or reaction, and, with little heat, to a yellowish red brown mass of the consistence of soft extracts, and of cinnamon odor. Z.

It dissolves quietly to an iodine colored liquid; it then turns yellowish brown, blackish brown, and thickens considerably.

Eth. sol. iodine.—No spreading; the color changes from iodine to a peculiar yellowish brown black; the liquid is of a uniform thick consistence and in thin layers transparent; in six hours it is of a darker color and the consistence of a soft extract.

Eth. sol. bromine mixes readily to a lemon yellow liquid which gradually turns brown to umber brown and is less thick than the product of the reaction of iodine.

Oleum Chenopodii Sem. — Thin, reddish yellow, Baltimore oil.

Iodine. — Rather slow reaction, without the evolution of vapors; the residue consists of a yellowish brown liquid and a dark brown resinous idione compound, readily miscible to a brown or yellowish brown oil.

Eth. sol. iodine causes a slight effervescence and forms two strata, the upper one of which is yellow, the lower one of a thick iodine color; afterwards spreading takes place, and in a few hours nothing has been left in the vessel.

Bromine.—Hissing fulmination, with red and white vapors; the residue is a reddish brown resinous mass, and a light brown liquid, which after a while are miscible to a deep yellowish brown oil. Odor altered, somewhat resinous.

Ether. sol. bromine.—The reaction proceeds slowly; the heavier liquid is reddish, tinged with brown; the supernatant fluid is light brown, almost clear.

Oleum Erigeronis.

The commercial article of this oil, which has a yellowish brown color, and has been recommended by eclectic practitioners, was used for the following experiments. As Mr. F. L. John, of Philadelphia, obtained but an exceedingly small quantity from Erigeron Philadelphicum, the examined oil must be gained from Erigeron Canadense; but I have no means of ascertaining its purity.

Iodine dissolves with radiating motion, but without explosion; the solution is iodine colored, and has a thick blackish sediment.

Ether sol. iodine mixes to a solution and sediment of the same properties.

Ether. sol. bromine is miscible, then separates to a brownish green yellow thin liquid, a brownish black sediment and a few violet colored spots.

Oleum Fœniculi — Almost colorless, agreeable and pure fennel odor.

Iodine. — Oils, rich in stearopten, show radiating motion, evolve some reddish vapors, and thicken to a syrupy or soft extractive mass; oils with much stearopten, produce almost instantly a solid brittle mass, which prevents the further reaction of iodine. Iodine seems therefore applicable as a test for the proportion of stearopten in oil of fennel; but stearopten altered by age does not congeal to such a brittle mass, and the specific gravity must then decide whether the oil is in its fresh state, or old and resinified. Z.

Iodine dissolves with radiating motion, and some vapors, to a yellow, afterwards red liquid; the dark sediment is with some difficulty miscible, and forms an extractive mass.

Eth. sol. iodine mixes uniformly to a bright red iodine colored solution, which, on standing six hours, is reddish brown, viscid.

Eth. sol. bromine produces a mixture, which is at first white and milky, and gradually shows some brown streaks; afterwards the supernatant fluid is milk white, tinged with greenish brown; the sediment has a purely brown color.

Oleum Gaultheriæ. — Brownish yellow, thin, oily.

Iodine dissolves quickly and completely with brisk reaction and some white vapors; the liquid is not thickened, and has a yellow iodine color.

Ether sol. iodine.—Some spreading; miscible to a yellowish red solution; after six hours the thin liquid is of a deep reddish yellow, without a trace of sediment.

Ether. sol. bromine.—Many white fumes are given off, reminding somewhat of the odor of fresh parsley root; the whole watch crystal is covered with a coating of a soft, resinous white substance, leaving some unaltered oil behind.

Oleum Hedeomæ. — Brownish yellow, thin.

Iodine.—Brisk reaction with explosion, and violet red and grey vapors; the residue is a purely brown and viscous liquid.

Ether sol. iodine.—No spreading, some effervescence; the supernatant liquid is thin, transparent, of iodine color, the sediment thick and dark; after six hours, the whole is of uniform tar-like consistence.

Bromine.—Vigorous detonation, with white fumes; the residue consists of a heavier yellow liquid, and a lighter one which is scarcely colored: they are miscible to a very pale, yellowish, thin oil.

Ether sol. bromine.—The heavier liquid assumes a purplish brown color; the supernatant fluid has a faint brownish tint; the whole is not miscible. By exposure to the air, and consequent evaporation of the upper stratum, small purplish circles are formed on the surface, and the sediment is rendered of a more yellowish brown.

Oleum Lavendulæ veræ. — Thin, almost colorless.

Iodine.—Quick and energetic explosion, much heat and many iodine vapors, the strongest reaction of any oil of the labiatæ. The yellowish brown residue is a soft extractive mass of a pungent acidulous balsamic odor. Z.

Brisk reaction, with detonation and reddish vapors; the yellowish brown liquid is miscible with the darker colored sediment, to a viscous brown mass of an acidulous aromatic odor.

Ether sol. iodine.—Miscible to a purplish iodine colored liquid; the purple shade gradually disappears, is afterwards rendered brown.

Ether sol. bromine.—The mixture is of a light greenish color, darkening, afterwards of a deep sea green; some aqueous drops separate at the bottom, which are of a light brown color.

Oleum Limonis.

I regret very much that I omitted to test a fresh oil of lemon. I had a specimen in my possession which was at least six years old, and had been kept for several years in a half-filled vial without opening it; it was of a pale yellowish color, about the consistency of oil of sweet almonds, and had a peculiar

resinous lemon odor. Knowing it to be unadulterated, I was desirous of applying the various tests to it and compare its behavior with that of the fresh oil; but I omitted it at the time, and never thought of it again until I came to prepare this paper, when my time was too much occupied to admit of making these experiments. Wherever in this paper I have used oil of lemon, it was the old thick article referred to.

Iodine.—Brisk fulmination, less heat than with oil of bergamot; the residue consist of a viscid mass and a thin liquid, which after some time are miscible to a uniform soft, somewhat liquid mass, with a modified odor. Z. (This reaction refers to the fresh oil.)

The action of iodine is a slow radiating motion, without evolution of fumes; the residue is a dark brown resinous mass and a yellow liquid, after awhile miscible to a soft sticky mass.

Eth. sol. iodine.—Miscible, with some flapping motion to a uniform yellowish, afterward more brownish iodine colored liquid, with but a minute sediment; the oil thickens, but retains after some hours a tarlike fluidity.

Bromine.—Explosion and white fumes; the residue is of a beautiful yellowish red viscid liquid, and a supernatant one of a pale yellow color, which in a short time are miscible to a thin pale yellow oil; odor little modified.

Ether sol. bromine.— Brisk reaction in the centre, around the ethereal solution; at the conclusion of the reaction, the liquid is of a reddish yellow color; and separates into a lower stratum of a greenish color and a lighter fluid, which is reddish white and milky.

Oleum Bergami and Limonis, equal parts.—The ethereal solution of bromine causes an irregular motion towards the circumference; the color is a light brownish yellow, after the reaction a greenish yellow brown.

Oleum Matricariæ. — Greenish blue, about three years old, well preserved.

Iodine. — Oil from fresh flowers, two years old, evolved a few reddish vapors, with little heat, the blue color changed through greenish into brown; the residue is tenacious. The residue from the reaction with old oils distilled from dried flowers, is soft, extractive. An oil six years old showed no heat or vapors, but yielded an extractive mass, which, after an hour could be removed from the glass, as if it had been greasy. Z.

No reaction and no solution is observable, unless the dish is gently heated, when few red vapors are given off, the color changes to brown, and the consistence to that of extract.

Ether sol. iodine is miscible with iodine color, afterwards thickening to a black semi-fluid mass, which in thin layers shows a green yellowish color.

Ether sol. bromine. — Miscible, the color is green, tinged with brown, the oil is not thickened.

Oleum Matricariæ citratum. — (Pharm. Barrus.) Greenish blue.

Iodine. — Brisk, detonating reaction; the liquid has a reddish brown color, and contains a darker sediment.

Ether sol. iodine is readily miscible to a yellowish red brown thin liquid, containing a sediment of a nearly black color.

Ether. sol. bromine, though mixing at first with the oil, soon separates into a greenish yellow thin liquid, and a thicker oily sediment of a deep green color; an excess of the bromine solution has little influence on the supernatant fluid, except by tinging it brown; but the heavy oil is rendered of a greenish brown color; the two strata are not miscible.

Oleum Melissæ. — Pale yellow, thin, three years old, well preserved.

Iodine, one grain, with two drops of fresh oil, evolves many reddish and grey vapors; the iodine dissolves quickly with considerable heat to a soft extract. Z.

Two grains to six drops produce radiating motion, with scarcely any vapors; the solution has an iodine color, and is thickened.

Eth. sol. iodine. — Spreading; mixing to a light red iodine colored solution; in six hours, the mixture had a dark brown color, was of a pitchy consistence, and its odor reminded strongly of jessamine, while by heating, it was altered to an empyreumatic melissæ odor.

Eth. sol. iodine. — The oil turns immediately to a bright yellow, and a few white vapors are given out; a quick separation into two layers takes place, the lower stratum assumes a brown color, the supernatant is yellow, clear. If a larger quantity of the bromine solution is added, the upper layer is soon changed to brownish green, while in the lower liquid, some undecomposed bromine solution is for some time observed in distinct globules within the brown color.

Oleum Melissæ four parts, oleum Limonis one part. — This mixture shows a similar reaction to the former, with the ethereal solution of bromine; but the color deepens in a shorter time, and the supernatant liquid shows a brownish yellow color, and is slightly cloudy.

Oleum Menthæ piperitæ Americ. — Crude oil, two years old, yellowish, thin.

Iodine shows a slow action, no vapors or heat; the whole is miscible to the color of burnt terra de sienna, afterwards alters to a blackish brown viscous liquid; the odor is somewhat altered.

Ether sol. iodine. — Spreading; the solution is uniform, and has a deep iodine color; after twelve hours, it was a thick chestnut brown liquid.

Ether sol. bromine. — The mixture show the following changes of color; yellowish, reddish, brown, dark brown, umber color; it thickens in a short time, and its odor is more modified than that of the residue from the iodine reaction.

Oleum Menthæ piperitæ Germ. — Rectified, nearly colorless, thin.

Iodine, aided by stirring, dissolves without any brisk reaction to a reddish brown liquid of the consistence of honey; the residue of heavier oils is thicker, but still fluid; oils distilled from old herbs evolve a few vapors. Z.

It has a quiet and slow reaction, and dissolves to a brownish liquid with which the black iodine sediment mixes to a syrupy liquid.

Eth. sol. iodine is spreading, miscible to an iodine colored liquid, which changes to a thick yellowish, blackish brown; after twelve hours it has a deep greenish brown color, and the consistency of butter.

Eth. sol. bromine. — The mixture has a beautiful rose-color, which gradually darkens, but retains in thin layers a pinky shade.

Oleum Menthæ viridis. — Yellowish red, old, rather thick.

Iodine dissolves slowly to an evenly thick iodine colored liquid.

Eth. sol. iodine shows little spreading, and mixes to an iodine colored solution; in six hours it is a thick, chestnut brown liquid, and after twelve hours more, it has a butyraceous consistence.

Ether sol. bromine. — A few white fumes are evolved; the yellowish red solution passes through various shades to a deep yellowish brown; the sediment is of a lighter color. (Separation of water ?)

Oleum Monardæ. — The crude oil, light brown, one year old.

Iodine dissolves quietly; during the first few moments a nearly vermilion red color is produced, which soon darkens to a brownish red; the nearly black sediment is of a pitchy consistence.

Ether sol. iodine is miscible to a clear iodine colored solution.

Ether sol. bromine mixes to a brownish violet color, which subsequently deepens to a dark purplish brown.

Oleum Myristicæ. — Colorless, thin.

Iodine. — Violent reaction with explosion, and with white and some purple vapors; the residue consists of a light blackish green solution, with a deep greenish brown sediment, which are miscible to a transparent liquid, assuming a more yellowish shade, and is subsequently light greenish yellow.

Ether sol. iodine. — The mixture has instantly a turbid yolk yellow color, and is afterwards transparent and colorless, regains a yellowish brown tint, and is rendered colorless again.

Ether sol. bromine. — At first colorless; the heavier part assumes a light brownish milky appearance, the brown shade afterwards disappears; the upper stratum remains transparent, with scarcely a brownish tint.

Oleum Patchouly.

Of this oil which is extensively used in perfumery, I had three different kinds at my disposal, of which at least two were of lots imported at different

times; they were all of a brown color, and about the consistency of olive oil; one approached more the consistence of castor oil; their very characteristic behavior was alike.

Iodine dissolves with radiating motion, without vapors, to an iodine colored solution which changes to brown black, afterwards to bluish green black; the liquid is not thickened.

Ether sol. iodine dissolves, without spreading, to a homogeneous dark green liquid, which is nearly black in appearance; after twelve hours no change had taken place, except the formation of a black precipitate.

Ether sol. bromine mixes with the evolution of a few white vapors to a solution of a splendid deep violet color; it deepens in its shade so as to appear almost black; upon the sides of the vessel, where some spreading had taken place, indigo blue stripes, and vermilion red spots were observed, the color of which darkened to greenish black and yellowish green black; the oil was not thickened; the sediment had the color of burned umber.

Oleum Patchouly two parts, oleum Limonis one part. — No difference from the reaction of the pure oil could be observed in the behavior of this mixture to the ethereal bromine solution, except that upon the sides of the dish a brownish green margin was visible.

Oleum Rhodii ligni. —Yellowish, slightly viscid.

Iodine. — Scarcely any action; but on stirring, the oil assumed a greenish hue, and gradually dissolves iodine, forming a deep greenish brown liquid.

Eth. sol. iodine. — Miscible with very little spreading, and scarcely any undissolved particles; the liquid has a peculiar yellowish brown iodine color; gradually it separates, the upper stratum being of a greenish yellow, the lower one of a greenish brown. In six hours it is again of a uniform thin consistence and of a greenish yellow brown color.

Eth. sol. bromine at first collects on one side of the dish, gradually sinks below the oil, and the reaction now shows a pure yolk color; then brownish stripes appear on the surface of the lower stratum, which increase in size until the color is entirely changed to umber brown; the supernatant liquid shows scarcely a brownish tint; after stirring the two together they separate again.

Immediately after the above reactions, the odor approaches nearer the perfume of roses, than in the original oil.

Oleum Rosmarini. — Yellowish, almost colorless, thin.

Iodine. — Radiating motion of the iodine solution, with few red vapors, and some heat; the yellow brown residue, of the consistence of a soft extract, has its odor unaltered. Another sample showed a curdy precipitate in a yellowish brown liquid, which could not be mixed to a uniform mass. Z.

With a brisk radiating motion and the evolution of white vapors, a solution is obtained of a brown color, tinged with yellowish green; the dark greenish brown sediment is miscible by agitation.

Eth. sol. iodine. — Two strata are formed, the lower one of which has a deep iodine color, while the upper one is much lighter colored.

Ether sol. bromine yields a colorless mixture, which separates into a colorless clear upper stratum, while the heavier oil is milky white; the latter then changes to a light brown, and the former is rendered white and cloudy.

Oleum Rutæ. — Yellow, with a bright brownish tint; scarcely thickish.

Iodine. — The oil prepared by Zeller dissolved the iodine slowly without heat, vapors or motion, to a yellow brown liquid; with the commercial oil little heat, a few vapors, and some radiating movement was observed. Z.

It dissolves with some radiating motion to a yellowish iodine colored liquid.

Ether sol. iodine. — On dropping it into the oil, some spreading occurs, the iodine sinks to the bottom, the supernatant liquid is yellow; without stirring, the two combine to a homogeneous solution of iodine color.

Ether sol. bromine. — The mixture is at first slightly cloudy, but has a pale brownish yellow shade afterwards.

Oleum Sassafras.

I have examined two oils, one anhydrous and colorless, the other one being yellowish brown and containing water, both perfectly transparent; they were the upper and lowest stratum of an oil saturated with water, which had stood undisturbed for about a month. (See Proc. Amer. Pharm. Assoc., 1858, page 355.)

Iodine dissolves without heat or vapors to a clear, uniform, yellow brown liquid, without thickening appreciably. Z.

It dissolves entirely without vapors or motion; the solution has an iodine color; the odor is unaltered.

The yellow oil has the same behavior, only effects the solution slower.

Ether sol. iodine mixes, with spreading, to an iodine colored liquid, which after five hours is limpid and of a rose color.

The yellow oil yields a darker solution, spreads more than the former, and after five hours had changed to a somewhat thicker, blackish brown oil.

Bromine. — Hissing, some heat, and white vapors; the oil is milky, and around the bromine shows a yellow and green color; odor somewhat resinous. The dark oil was not tested.

Ether sol. bromine mixes easily, with some heat and vapors; the mixture is milky, with yellowish spots at the bottom.

The dark oil shows the same reaction; the liquid is milky, gradually turns green; the sediment yellowish, then green and getting darker; the margin is now blue; then violet, and subsequently rose color.

Oleum Serpylli. — Pale yellow, nearly colorless; thin.

Iodine produces radiating motion with the oil from the fresh herb, which evolves few yellowish red vapors; with oil from the dried herb, the reaction was stronger, more heat and more vapors were given out; the residue has an extractive consistence. Z.

A brisk radiating reaction takes place, the solution has an iodine color and is miscible with the dark sediment.

Ether sol. bromine. — Some spreading; the solution is yellowish red; after six hours, brownish yellow.

Ether sol. bromine. — White vapors; each drop is immediately decolorized; the oil gradually turns to a greenish color.

Oleum Spicæ. — Old, greenish yellow, oily consistence.

Iodine explodes with less force with this oil; than with oil of lavender, it evolves less fumes, but more heat; the yellowish brown residue is of soft extractive consistence and has a modified balsamic odor. Oil of second quality evolved few red fumes only by the influence of a larger proportion of iodine; less heat, no vapors, more fluid residue. Z.

It dissolves slowly by stirring, and has a tar-like sediment.

Ether sol. bromine mixes to a transparent, reddish yellow liquid.

Oleum Tanaceti. — Pale yellow, thin.

Iodine dissolves quietly without heat and with little radiating motion; the residue is liquid, of the consistency of a thin syrup and unaltered odor. Z.

On the introduction of the iodine, a brisk reaction takes place, with many grey and a few violet vapors; the solution is deep yellowish green, afterwards purely green, and is miscible with the remaining black sediment.

Ether sol. iodine. — The upper portion is of a yellow iodine color; the lower stratum is thick, brown; miscible to a yellowish red iodine colored transparent liquid.

Ether sol. bromine. — The mixture is at first colorless, separates into a thin milky liquid and a heavier light brown oil.

I was not aware of the considerable variation of the result of the above experiment with iodine, from the results of Zeller, Liebig and Tuchen, until I was collecting my notes for this essay. I knew that the oil employed by me was several years old, but as it had preserved its physical qualities, I was satisfied about its purity; particularly the odor was purely that of tansy, without any admixture. Zeller states, alcohol of .85 dissolves the oil in all proportions; that which I experimented with, required three parts of alcohol for complete solution at 70° F. The reactions as stated by me, seem to coincide with an adulteration with turpentine; but judging from all physical properties, I am still of the opinion that the oil is pure, somewhat modified by age. Could age produce such a difference, or is this the effect of our climate? I shall have to inquire into this matter.

Oleum Valerianæ. — Light brownish yellow, rather thickish.

Iodine dissolves with little heat to a dark yellow brown mass of extractive consistence; some genuine oils evolve few greyish yellow vapors. Z.

The solution is effected with very slight radiating movement; the liquid part is yellowish brown, the sediment nearly black; without stirring, the whole assumes gradually a pitchy consistence.

Ether sol. iodine is miscible with an iodine color to two not well defined strata, which by agitation, are easily miscible.

Ether sol. bromine. — Each drop produces a deep purplish black coloration; a separation into two strata takes place, the lighter one, being in the smallest quantity, assumes such a deep violet color as to appear black; the heavier one is of a greenish black color; around the margin of the whole liquid are reddish and bluish spots and streaks.

III.—The Sulphuretted and Nitrogenated Oils.

Oleum Amygdalæ amaræ. — One colorless, another one brownish, pale.

Iodine. — No reaction takes place in the cold or by moderate heating; a little iodine dissolves with brown yellowish red coloration and without thickening. Z.

My experience with both oils coincides with this observation.

Ether sol. iodine mixes quietly and readily to a deep iodine colored liquid; the whole of the liquid is spreading out, working up the sides of the vessel a thick black margin; in six hours the whole has run together again, and forms a dark brown colored mass of the consistence of honey.

Ether sol. bromine dissolves without reaction; after favoring the evaporation of the ether by a current of air, a separation takes place into a deeper and a lighter red colored liquid, with slight cloudiness on the dividing line of both.

Oleum Sinapis. — Light yellow.

Iodine dissolves quietly without external reaction to a brownish yellow liquid which is hardly thickened. Z.

It forms easily a perfect solution, with scarcely any radiating motion; the color is a red iodine.

Ether sol. iodine. — Miscible without any peculiar reaction to a reddish yellow iodine colored liquid.

Ether sol. bromine. — Miscible, colorless, subsequently slightly milk white.

Remarks on the Course of Observation. — Above I have described the manner in which the experiments were performed, by giving directions for preparing my test liquids, &c. I have also given the mode of Zeller's procedure with iodine, which as far as quantity is concerned, I have carefully followed. But one great difference in the mode of our observation is, that Zeller applies a moderate heat to the thicker oil, so as to render the fluidity of all about alike, while I have taken the opposite course, by making the experiments at

as nearly as possible alike temperatures. Necessarily, a difference in the degree of the reaction of iodine must arise, and by comparing the energy of the reaction of the more viscid oils, such a difference, slight and unimportant though it may be, will be noticed, the most vigorous reaction being obtained by Zeller's method.

In the subsequent course of observing the changes, I have also followed another suggestion. Zeller, after the first reaction is over, stirs by means of a glass rod, the undissolved iodine together with the liquid. It appeared to me more important, to notice not only the reaction of the iodine on the oil, but likewise that of the oil upon the iodine. This is the reason that in my observations, we often meet with expressions, like "dark extract," "deep brown pitchy sediment," &c.; this sediment is generally occasioned by the undissolved iodine, which on the point of its contact with the oil, is often changed to a resinous mass which envelopes the unused iodine, preventing its farther action on other particles of the oil. This is another cause of the difference between our observations; but my course appeared to me to be the better one, as, though the energy of the reaction may be partly lost, more time is gained for observing the intermediate changes, while the final results will in most cases be nearly alike, although from the greater amount of heat, necessarily developed by agitating the two reacting substances, a farther going change might reasonably be expected.

NOTES UPON THE OFFICINAL PREPARATIONS OF METALLIC MERCURY WITH A NEW MERCURIAL MACHINE.

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In the October number of the American Journal of Pharmacy for 1850, Dr. Edward Jenner Coxe, of New Orleans, published a method of preparing mercury with chalk, by means of shaking the materials together in a bottle; which method had been communicated to him by Mr. W. Hewson, formerly a druggist of Augusta, Georgia. In the April number of the same journal for 1852, Mr. Peter V. Coppuck, of Mount Holly, New Jersey, published a similar method for preparing mercurial ointment, in which he effected the necessary shaking by attaching the bottle to the saw-gate of a saw-mill, during three days. And in the same journal for July, 1852, Mr. James Beatson, of the Naval Hospital, New York, published a formula for blue pill, by which the mercury was comminuted by trituration with honey, and the other ingredients of conserve of roses were afterwards added in succession.

Although in view of the experiments of Bœrhaave in making his ethiops *per se*, by means of windmills and other wheels, the idea of dividing the mercury by succussion, rather than by trituration, could not be considered either novel or original, yet these publications led the writer to believe that much

better and more uniform preparations might be made, and much time and labor be saved, by some elimination and modification of these ideas, and the application of proper mechanical contrivances. Accordingly, during some three years past, three plans have been tried, and two machines put in operation, with the effect of finally arriving at a practical result, which is considered to be an important improvement in the pharmacy of these preparations, and which it is the object of this paper to communicate to the Association, in the hope of improving the condition of the common market in this important class of medicines.

The desideratum in respect to these preparations is now generally conceded to be that the mercury should be in a finely divided state, and free from oxidation. At least the writer's own observations have thoroughly convinced him that the valued characteristic mildness and gentleness of action in these mercurials is in direct proportion with their freedom from oxides of mercury; and, therefore, to divide the metal properly, and, at the same time, to secure it against oxidation, were regarded as the points of primary importance, and conditions which any method must fulfil in order to be successful. After the expenditure of the usual amount of time, labor, and money, by which alone a great majority of all practical results are arrived at, step by step, the machine, of which a drawing is herewith presented, was constructed and put in operation with good effect. It was made from the writer's original drawings by Messrs. Hewes & Phillips, machinists, of Newark, N. J., at a cost of $137. Upon a recent inquiry of this firm, with a view to this publication, it appears that now they are in possession of the working drawings and the necessary patterns and experience with the work, they can make them at a much lower price, namely, $120.

The machine consists essentially of two gates or frames, each capable of holding securely a bottle of the capacity of one gallon, moved up and down in guides, by means of connecting rods or pitmans, and a crank shaft and pulley; and it may be briefly described in reference to the accompanying sectional drawing as follows:—

A. Frame of ash plank, 4 by 12 inches, held together by double tenons and screw-bolts.

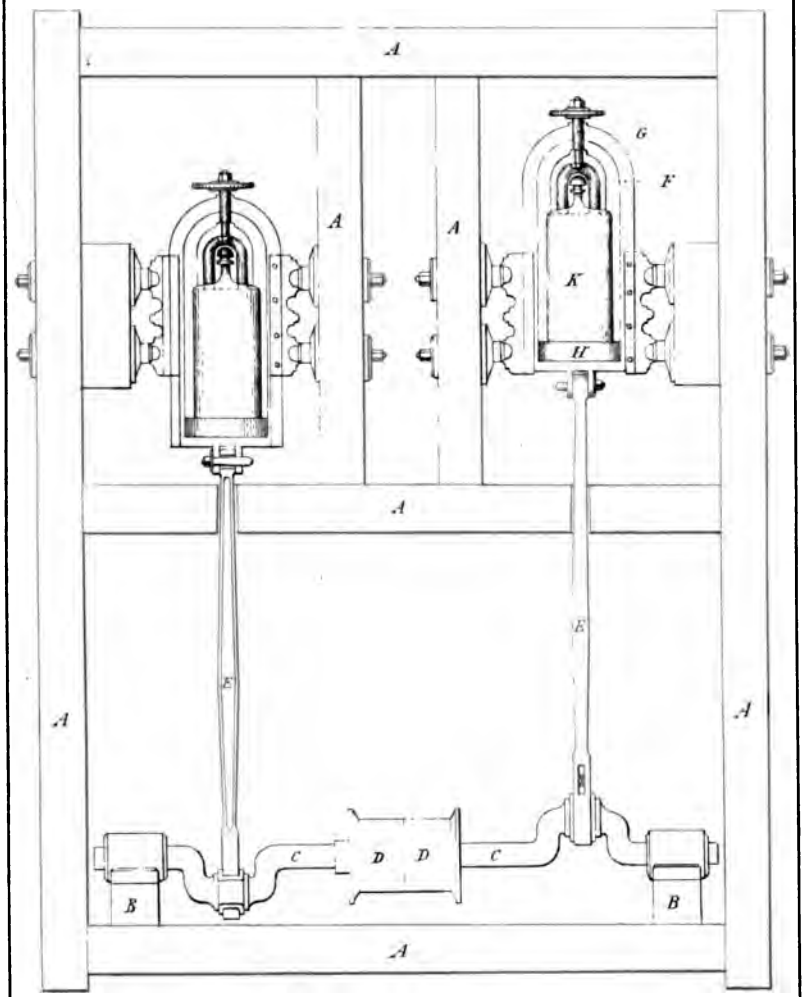
B. Blocks or bolsters supporting the journal-boxes of the driving or crank-shaft.

C. Crank-shaft for giving the shaking motion, operated by a 4 inch belt upon a central fast and loose pulley D. This shaft is made in two parts and coupled, the fast pulley being the coupling.

E. Connecting rods or pitmans, made hollow for lightness.

F. Frame of wrought iron for holding the bottle, free to move vertically in the guides.

G. Guides, bolted securely to the frame, one side of one guide being fitted with a composition jib and set screws for taking up lost motion by wearing.



Scale 3/4 inch to 1 ft.

Geo C Rand & Avery Lith

H. Round wooden block, fitted into the lower part of the gate or frame F., upon which the bottle is placed.

I. Screw, with wheel, passing through a boss at the crown of the gate F. To the point of the screw is attached loosely, by means of a shoulder and nut, an iron cap, the lower edge of which, by being forced down into the shoulder of the bottle by the screw, holds it firmly in its place. About one-sixth of this cap is cut away to allow the head and neck of the bottle to be passed in and out.

K. The bottle in position. The fragile bottles, with their somewhat insecure corks, might be advantageously replaced, as was originally designed, by cast iron vessels, of similar size and somewhat similar shape, with a cover fitted by a ground bevelled joint, at a point corresponding with the shoulder of the bottle.

The frame is securely fastened in all directions in the upright position, and the shaft driven at a speed of 240 to 250 revolutions per minute. The motion would be rendered more uniform and more effective, if there was a small fly-wheel placed upon a prolongation of the shaft, outside the frame. In the use of ordinary glass bottles, however, this would be at times objectionable, when a cork becomes loose, and it is necessary to stop the machine suddenly.

When driven at the speed indicated, the bottles and contents become pretty rapidly heated by the friction and succussions, and it is necessary then to remove the corks, to relieve them from the danger of being blown out, or the bottles burst, by the pressure of expanded air within; and in a continuous process on a large scale, it is best to use two sets of bottles, one set of which has time to cool while the other is in motion. In this manner the mercury for 200 lbs. of blue pill may be very thoroughly divided in the space of six hours, so that the globules are of uniform dimensions, and but just barely visible in a strong light with a good pocket lens. Of course the amount of oxidation possible, is limited by the amount of air contained in the bottle with the ingredients; and this, by actual experiment, proves to be so slight as not to be appreciable upon ordinary examination. For the most perfect and rapid comminution, the bottles should be about one-third filled by the materials, since the "throw," or limits of motion of the machine, is calculated to give the most thorough and effective succussion when thus charged.

The making preparations of metallic mercury is by no means all, though, perhaps, the most important, uses of this simple machine, since many binary compounds may be made by it very speedily and very perfectly. Thus, for instance, iodine and iron with water, after the active reaction is over, are very perfectly combined in a very few minutes. Mercury and iodine with alcohol, and some other similar compounds, are easily and rapidly made, while mercury and sulphur are combined to form vermilion, the hue of which has been judged to excel all except the Chinese. Such decompositions as that of iodide of iron by metallic cadmium, in making iodide of cadmium, are also rapidly and

conveniently effected. For such purposes as washing chloroform, ethers, oils, etc.; for saturating solutions, and many minor purposes, it is also very useful, and becomes a valuable laboratory assistant.

In using this machine, the following are the formulæ which the writer finds very convenient in practice. They are deduced from the formulæ of the Pharmacopœia, and yield preparations strictly in accordance with it in mercurial strength, and in detail of materials, except in the introduction of honey into the mercury with chalk, and the increased proportion of suet in the mercurial ointment.

HYDRARGYRUM CUM CRETA.

Take of Mercury, strained,	. . . . .	20 lbs. Avoirdupois.
Honey,	. . . . .	3 " "
Prepared chalk, English precipitated,	.	31 " "
Water,	. . . . .	4¾ gallons.

Introduce half the mercury and half the honey into each of the gallon bottles, and shake the mixture for three hours. Then mix the chalk into a paste of a uniform consistence with the water, in a proper vessel, and having added about three pints of this mixture to the contents of each bottle, shake the whole for half an hour. Then pour the contents of the bottles into the mixture of chalk and water, and rinse out the bottles with a little water; and, having thoroughly stirred the whole into a smooth, uniform mixture, transfer it to a strong muslin strainer, and jolt the strainer occasionally, until no more liquid drains off. Then break the mass up into fragments, spread it upon drying frames, and dry it at a gentle heat, until the lumps break very easily into a smooth, sabulous powder. Finally, crush the lumps in a mortar, without much trituration, and preserve the resulting powder in bottles secluded from light.

In mixing the chalk, a porcelain-lined or stone-ware vessel, with smooth surface and round bottom, is preferable, as facilitating the uniformity of the mixture. The proportion of water directed, minus four fluid ounces, reserved for rinsing the bottles, makes the chalk into a paste, which, although fluid enough to be poured, is not thin enough to allow of easy separation of the water at the surface, or of falling of the mercury to the bottom, either in the vessel or in the strainer. In mixing, the chalk should be added to the the water in successive portions, with stirring, and not the water to the chalk, because a more perfect mixture is thus effected in a shorter time. In the draining, about three gallons of water and honey will separate, leaving the 20 lbs. of mercury, 31 lbs. of chalk, and about 1¼ lbs. of honey, with the remainder of the water, on the strainer; but when the remainder of the water is dried out, the preparation weighs fully 52 lbs., sometimes 52½ lbs. The proportions of the officinal formula require 53⅓ lbs. as the finished result; but there is always some accidental loss in the process, and as the loss falls most

heavily upon the mercury in the pouring, shaking, etc., the figures as given yield, in practice, a more accurately officinal result than if a larger proportion of chalk be used.

The resulting preparation, of which a specimen is exhibited to the Association in the collection of Messrs. Carter, Colcord & Preston, is one of a far lighter color than that usually met with, and is bluish-gray, not blue.

This difference from the usual standard is probably because the color of the commercial article, when due to mercury at all, is heightened and changed by the portion oxidized in the process; and it varies with the quantity of oxide and the stage of oxidation, from a dull grayish-blue to a lighter, and sometimes even rosy tinge.

In this preparation the mercury may be readily seen by the microscope, or with a single powerful glass, upon a gently compressed surface of the powder, or on rubbing it very gently upon the hand; but strong, or even moderate, friction between the finger and thumb renders the mercury very plainly visible even to the naked eye, because in this, even more easily than in any other preparation of metallic mercury, some of the little globules are thus made to run together. The preparation, when well made, is rather tender or delicate, and careless or rough manipulation under strong friction, particularly upon a certain class of rough surfaces, will at times cause the mercury to run together, and spoil the preparation. If the mixture of mercury and honey be added to the chalk without wetting the latter, no matter how finely the mercury may have been divided, it runs together at once, and is nearly all of it speedily found in its original bright fluid state at the bottom of the chalk. If the chalk be then mixed with water, a little levigation separates the remainder of the metal in a more or less divided state; and thus the whole of it, as nearly as can be ascertained by a scale which weighs 20 lbs., may be recovered, leaving the chalk as white and clean as it was originally. Therefore, in this preparation, the materials are in a mere mechanical mixture, or at least the proportion of metal oxidized must be too small to produce the slightest practical effect.

The use of honey in this formula is not authorized by the Pharmacopœia, yet the writer believes that the preparation is rendered more uniform and more stable by it, and that thus the aim of the Pharmacopœia is better attained. The writer is fully aware that such infringements or interpolations of officinal formulæ are improper and dangerous, because they become precedents and examples for irregularities and departures of all kinds; and it is not even a valid excuse for this to assert, from absolute experiment, that he does not believe that the preparation can be made on a large scale in strict accordance with the letter of the officinal formula.

In medicinal effect, the preparation by the above formula, unlike the commercial article, neither vomits nor purges, but produces rather a sedative effect in the class of cases in which it is indicated, while its exhibition is pretty

speedily followed by the desired change in the evacuations, and by the mild, alterative effect. It is emphatically a mild and not an irritant preparation, while of its due efficacy there appears little room for doubt.

The formula can be pretty easily and conveniently used by the pharmaceutist in the small scale, the bottle being shaken by hand. Using the quantities of the officinal formula with half an ounce of honey, the mercury may be well divided with about three hours' shaking. This shaking, of course, need not be a continuous operation, but may be performed five or ten minutes at a time, till the proper degree of comminution is attained. In order, however, not to leave this point of proper comminution open to variations of judgment or opinion, it is proper to keep good account of the time, so that the whole shaking be not less than three hours, since, unlike the process by trituration, the comminution is in pretty direct ratio with the amount of labor. The process by trituration cannot be properly effected in double this length of time when performed in the most dexterous and skilful manner, whilst, if attempted without the dexterity, it is almost impossible to accomplish the object at all, since strong, forcible trituration will cause the mercury to run together in any preparation the writer has seen tried.

In concluding this notice of this preparation, the writer refers to a paper upon it, published in the American Journal of Pharmacy, 3d Series, Vol. v., No. 5, and also to a note on the same preparation, in a paper read before this Association last year, in order to correct some minor points in accordance with farther experience. In the first of these papers, is a statement that the powder of mercury with chalk, when good, is never mobile or sabulous, but always a little cumulative or clammy. This statement is erroneous, or, at least, needs the explanatory modification, that such properties of the resulting powder belong to the character and quality of the chalk used; and the English precipitated chalk usually found in the market, in seven or fourteen pounds bundles, appears best adapted to the purpose, and always yields a flowing or sabulous powder.

Another statement in the last mentioned paper, to the effect that it is impossible to prepare the powder properly on a large scale by shaking in a bottle, has been since disproved, by the introduction of honey into the formula as a vehicle for the comminution.

PILULÆ HYDRARGYRI.

It was for the improvement of this preparation particularly that special attention was directed to perfecting the new machine; and the success in this instance led naturally to is application, first, to the ointment, and lately to the mercury with chalk.

Take of Mercury, strained, ...	33½	lbs.	Avoirdupois.
Honey, ...	6	"	"
Red Roses, powdered, ...	4	"	"
Sugar, light brown (known commercially as "Stewart's B."), . . .	35½	"	"
Liquorice Root, powdered, ...	17	"	"
Rose water, ...	1	gallon.	

To half the mercury, in each bottle, add half the honey, and shake the mixture for three hours. Then dissolve the sugar in the rose water, by means of heat, and, when the solution is complete, stir in first the powdered liquorice root, and then the powdered rose leaves, until a smooth, uniform paste is formed. Then add the contents of the bottles; rinse them out with a very little water, and again stir the whole very thoroughly.

Allow the whole to cool over night, and then, by a kneading machine, by a pair of rollers travelling at equal speed, or by hand, knead and beat the mass, by portions, into a uniform color and consistence, taking care to avoid much friction upon the surface of the lumps in manipulating them. When the mass is weighed off into pots, the upper surface should receive a light coating of glycerine. When properly managed, the mass weighs 100 lbs. Avoirdupois, and puts up 99 lbs. in pots of 1 lb. each.

The preparation thus made is of the exact strength and composition directed in the officinal formula, since due allowance is made for loss in manipulation, except that, in heating the rose water, some of the odor must be lost. This is, however, of so little importance here, that in any reconstruction of the officinal formula, the rose water might be, without disadvantage, replaced by water.

In mixing the materials, a smooth iron pot, or one with a porcelain lining, answers very well, and the heat used should be by steam. The sugar should be in perfect solution before the powders are stirred in; and in proportion to this, and the thorough warming of the mixture before adding the mercury, is the smoothness and dark color of the resulting mass. If the thick syrup be not hot, its moisture does not penetrate the powders well, and the mass then has more of the color of the dry liquorice root powder. At best, however, it is of an olive color at first. This is improved by the kneading, and still farther by a few months' keeping, during which time the powders gradually absorb the moisture more thoroughly.

When the mixing is finished, and the vessel to be left over night that the mass may cool and stiffen, the mixture should be well scraped down from the sides, and the mouth of the pot be covered by a wet cloth, otherwise the portions adhering to the sides above the mass become so hard and dry, by the heat of the vessel, that in scraping them down some of the mercury will, unavoidably, be made to run together. The pot cannot, under any circum-

stances, be scraped very clean with safety to the preparation, unless the mass be soft, and much care be used.

In the case of this preparation also, the color is lighter and somewhat different from the commercial mass. It is gray, rather than blue, but with bluish, and also an olive tint. When well made it has a slight odor of the roses, and never becomes hard or friable. If due care be not taken, in manipulating it, to avoid much friction upon the kneading-board, sparse globules of mercury may be sometimes seen upon the exposed surface; but no scrutiny, even with the aid of an ordinary lens, should be able to detect globules on breaking open the mass. Gentle friction between the finger and thumb, or upon a piece of white paper, just so as to get a thin layer spread out, should render the mercury visible by the aid of a strong glass; and if the friction shall not have been so great as to cause the globules to coalesce, they will appear of a very uniform size, and uniformly distributed through the mass.

No ordinary kneading, or pounding, or pressure, will cause the globules to run together upon the surface or internally; but the writer has often seen a single hard rub upon the kneading table, where a little of the mass may have become hard and dry, from absorption of its moisture by the porous wood, produce a surface, both on the table and on the lump of mass, covered with globules visible to the naked eye, from a preparation that was unexceptionable. It has thus happened that careless persons have inexcusably spoiled the character of a good preparation.

In no way has the writer ever been able to detect oxides of mercury in this preparation; and, in practical application, its characteristic mildness and efficiency of action appear well sustained. As a deduction from the experiments of Mr. C. Bullock, of Philadelphia, given in his valuable paper upon this preparation, read before the Association last year, the presence of oxides of mercury need hardly be feared in a well-made mass, when the officinal formula is complied with; and he has given an entirely new point of great significance and importance to the value of using only conserve of roses as an excipient for the mercurial. The common practice of using some cheap form of starch to form the mass, although never admissible or excusable, is now shown to be more than ever reprehensible.

At the request of the writer, his friend, Mr. P. Wendover Bedford, pharmaceutist, of No. 717 Sixth Avenue, New York, made some detailed experiments upon this preparation, with a view of ascertaining whether the method of shaking might not be advantageously substituted for that by trituration, upon a scale applicable to the wants of pharmaceutists, and the results of his skilful trials show clearly that by operating upon quantities only three times greater than those directed in the Pharmacopœia, (namely, three ounces of mercury,) and by using the separate ingredients of the conserve of roses precisely as given in the above formula, an excellent preparation may be made in about three hours' shaking, samples of which from Mr. Bedford's hands, are herewith presented to the Association.

To those who know the amount of labor and time that must be given to the process by trituration with conserve of roses, the above results of Mr. Bedford, will hardly fail of due appreciation; and should this modification be admitted in the Pharmacopœia, it may encourage many pharmaceutists in the most laudable course of preparing as far as possible their own more important articles.

UNGUENTUM HYDRAGYRI.

Take of Mercury strained,	.	25 lbs.	avoirdupois.
Lard,	.	15 "	"
Suet,	.	10 "	"

Warm four pounds of the lard until it can be conveniently poured into the bottles, and then put half of it, and half the mercury into each bottle and shake the mixture for three hours. Then warm the suet and the remainder of the lard together in a proper vessel until the mixture becomes transparent, and having added the contents of the bottles, set the vessel in cold water, and stir vigorously until the ointment stiffens.

The proportion of suet here given is far beyond that directed in the officinal formula, and necessarily so, since it appears impossible to obtain lard that will yield a stable ointment in the proportions of the officinal formula. For many years past, quantities of this ointment have been spoiled by the writer in the endeavor to make the officinal formula yield a proper preparation, and little by little the proportion of suet has been increased till the above proportions have been arrived at, and still the ointment thus made separates during the summer of the Southern States, a stratum of fat, free from mercury being found on top. In making, again the writer has determined to use equal parts of lard and suet for the purpose of securing a stable ointment. It is rare now, or rather in the writer's experience impossible to get the old fashioned "beef lard," upon which the officinal formula is based, and the nearest approach to it is the so-called "pressed" or "perfumer's lard," and this is the article used in the above formula. It is commonly very white and clean, and free from saline matter and commands a high price, and yet it will not yield an ointment that will resist the hot weather without the proportion of suet above indicated.

In this method of dividing the mercury, there is no need of the common slovenly additions of old candles or other form of rancid fats, and the finished preparation is as sweet and odorless as the best lard can be, yet the mercury is very finely divided, and no instance has ever reached the writer in which the ointment was found imperfect or inefficient in its medicinal application.

There appears to be no inconvenience in practice from having the ointment of a firm consistence, because the heat of the skin is always sufficient to melt it during inunction. As commonly met with in the shops, particularly when intended for the Southern market, it is of the consistence of tallow, and is probably made from tallow. It is, therefore, rather a cerate than an

ointment, and really appears to require this consistence in order to retain a uniform composition.

This preparation may also be made in small quantities in a bottle, by hand-shaking, more perfectly, and with the expenditure of much less time and labor than by trituration. But, if the shaking be not performed continuously or at short intervals, the bottle must be kept setting in tepid water, or in a warm place, in order to keep the mixture sufficiently fluid. The same aggregate time of shaking, namely three hours, is required for this preparation.

New York, September, 1859.

ON LIQUOR FERRI IODIDI, AND THE TESTS OF IODINE.

BY FERDINAND F. MAYER, NEW YORK.

In laying the following remarks before the meeting, I must state that some of the facts I shall mention are truly enough not new; but as I have endeavored to arrange and harmonize them with my personal observations, they may contribute much to the understanding of the changes which this preparation is liable to, and of the remedies proposed for their alleviation.

First, as to the strength of the liquor. I have made this preparation by all the formulas given in the different pharmacopœias and books, some with a greater or less excess of iron, some with iron wire, others with filings, some with application of heat, others without; some filtered into sugar, others into syrup — but in not a single instance have I found them to contain fully the proportion of iron corresponding to the amount of iodine employed.

The solution, always directed to be made by digesting iodine and iron in varying proportions, is of an acid reaction. It is thus not only shown by the test on blue litmus paper, which might possibly and partly be supposed to arise from the action of the iodide on the organic substance, but also by the continued disengagement of hydrogen gas, if ever so slow, going on in the solution when digested at a higher temperature with clean iron wire or metallic zinc. That a formation of hydro iodic acid takes place during the reaction, in the first place, of iodine on iron is made quite perceptible by the smell of carburetted hydrogen arising form the mixture, especially when heated or made from filings. This excess of hydro iodic acid, in no case amounts to more than two per cent. of that in combination, but is in no other way injurious to the preparation. A deficiency of iron is further caused by the never wanting impurities of iodine. I shall further on return to the tests of this substance.

The strength of the officinal solution in iodide of iron should be set down as seven grains per ounce.

The large excess of iron used, does in no way contribute to increase the proportion of it going into solution. It rather causes a loss of iodine by in-

ducing too rapid a combination and evolution of heat. The ingredients should be kept as cool as possible, though it may require a little more time. Application of heat will always drive off a portion of iodine; and much more sesqui oxide of iron will be found suspended in the liquid after heating.

The use of iron filings should be discarded. Not only that they are objectionable on account of the impurities which they unavoidably contain, but their action on the iodine is far too rapid, even when no heat is applied. An admixture of brass filings, which must have been used in the coppery preparation, examined by Mr. Maisch some years ago, is by no means uncommon.

It is of some importance that the water employed should be free from organic matter and air. Distilled water is directed to be used; but I venture to say, this direction, as in most other instances, is but rarely followed. There is somewhat of an excuse for the scarcity of distilled water in the shops, from the fact that it costs far more than would balance the advantages derived from its use in many preparations. But, why not use melted ice? It is strange that so excellent a substitute for distilled water has hardly ever been mentioned. The writer has been using it during the whole summer for the same purposes, and never found it to act in the slightest degree on nitrate of silver or baryta. It is best prepared by melting clean, transparent pieces of ice in a glass jar, and drawing off by means of a siphon, from what sediment may have formed during melting. I would recommend this to the consideration of the Association, since, throughout the whole country, ice has now become so common an article for domestic use, that pure water will be within the reach of every one, if its production in the manner indicated is once admitted as a fact.

The mixing of the ingredients should not take place in a porcelain dish, but a glass flask or vial, since no heat from without is required to induce their action on each other. Of the recipes published for this preparation, none appears to answer so well as that given by Dr. Squibb, (vide Proceedings for 1858,) principally by the manner in which the fresh solution is protected from the action of air from without, and that in the sugar. This one cause of the changes, which the saccharine solution undergoes, is most effectually removed by filtering into syrup. But not the action of the air, which afterwards comes into contact with the liquor, from the surface downwards. I have as yet not seen a liquor or Syrupus Ferri Iodidi which did not turn brown when the bottle containing it was frequently opened or left open.

The following experiments were made as continuing those of Mr. Maisch, published in the American Journal of Pharmacy of 1854. I merely give the results of the different tests, the details being too lengthly. The solutions were all made with chemically pure iodine and fine iron wire.

The officinal Liquor Ferri Iodide contains free hydro-iodic acid, and the quantity of iron in solution is not sufficient to bind all iodine.

Cane sugar is completely changed to grape sugar by heating with dilute

hydro-iodic acid Freshly prepared simple syrup, diluted with water and heated with a small quantity of hydro-iodic acid, a portion of the liquid precipitated by nitrate of silver and filtered, the excess of silver removed by carbonate of potassa, and the filtered liquid added to a hot alkaline solution of potassio-tartrate of copper, — showed the distinct reaction of grape sugar, that is, precipitation of suboxide of copper. To judge from the test with ferri cyanide of potassium, as lately given by Anthon, no cane sugar was left in the liquid.

Cane sugar is changed to glucose with hydro-iodic acid and the light and heat of the sun acting together. The qualitative tests were made as above, and showed the presence of grape sugar, but only in a small proportion.

Hydro-iodic acid dissolves a large amount of hydrated sesqui-oxide of iron, forming a yellow solution, and a deep blue precipitate with ferro cyanuret of potassium. On heating it turns pale under escape of iodine, and then precipitates a paler blue. When cane sugar is present, it is converted into glucose.

The browned Liquor Ferri Iodidi heated with hydro-iodic acid or iodine is brought back to its original color with disengagement of iodine and formation of grape sugar. It then gives a pale blue precipitate with ferro cyanide of potassium, which turns dark rapidly. To find the presence of any acid besides hydro-iodic, I precipitated part of the bleached liquid with nitrate of silver, washed the precipitate, and decomposed it by digestion with metallic zinc. The solution of zinc, which should contain all the iodine previously combined with the silver, was precipitated by carbonate of soda, and the alkaline solution tested for iodic acid, qualitatively and quantitatively. It showed no formation of iodine by the addition of hydrochloric acid, but some was set free by sulphuric acid. The first test is conclusive as to the absence of iodic acid, the latter reaction takes place with all iodides; whether an iodate be present or not. I determined the quantity of iodine present by oxidation with a graduated solution of hypochlorite of soda. The amount found corresponded precisely with the quantity of the silver contained in the precipitate.

I conclude from this absence of iodic acid in the decolorized liquor prepared from pure iodine, that the sample examined by my friend Maisch, had been made from iodine containing a small portion of chlorine. This is a very common admixture, and very few samples of iodine will be found, which, when water is poured on, do not at once give a brownish solution, owing to the presence of choride of iodine.

The change which takes place on exposing Liquor Ferri Iodidi to the air is owing to the action of atmospheric oxygen on the protoxide in solution, precipitating a basic hydro iodide of the sesqui-oxide of iron, and setting free some hydro iodic acid, which in connection with the acid of the solution, partly decomposes again some of the sesqui-oxide, forming protoiodide and free iodine. When this brown liquor is heated in a poreclain dish, its color becomes lighter in the measure as the free acid decomposes the sesquioxide, and

the iodine is dissipated. It turns colorless if hydriodic acid or iodine be added while boiling. *It may be evaporated to dryness in a salt bath, allowing a slight excess of iodine to be present during the whole of the evaporation, and it will again be perfectly soluble in water, yielding a green precipitate with potassa.* During the heating most if not all the cane sugar of the solution is converted into glucose. A similar reaction takes place when the stoppered bottle containing the brown liquor is exposed to the direct rays of the sun. Here the formation of glucose by hydro-iodic acid takes place, though not as complete as in the open dish; but it super-induces the action of the acid on the suspended sesqui-oxide, which is thereby completely converted into protoxide, its oxygen and the hydrogen of the acid being taken up by the sugar.

That sesquioxide of iron is dissolved by hydriodic acid and converted into protoxide by heating the solution, is an old fact, and a number of very delicate volumetric methods are founded on this reaction. Any one may repeat the experiment with a dark liquor ferri and a small quantity of iodine, tincture of iodine, or iodide of potassium. The result will in all cases be a protosalt of iron. Acting on this principle the evaporation of the solution in water will be rendered more simple, and will furnish a perfectly soluble salt, if during evaporation a small excess of iodine be directed to be added.

But even though the Liquor Ferri Iodidi when heated with iodine may have lost none of its original qualities, its permanency is hardly better than before. Nor does the presence of bright iron wire in the syrup appear to prevent the separation of sesqui-oxide. Among the deoxidizing substances within our reach, there is, however, one, the chemical and medicinal properties of which are by this time well understood, which in analysis is frequently employed to act either on iodine or sesqui-oxide of iron, and which, besides, is very cheap, — I mean the *Hyposulphite of Soda.* You will find among the preparations submitted to the inspection of the meeting, a bottle labelled, "Protoiodide of Iron, without Sugar." It is, or ought to be, a perfectly limpid, pale green liquid, containing the same proportion of iron as the officinal liquor, but one-sixteenth more than the amount of iodine. It is prepared as follows:

Take of	Iodine, ...	two ounces and one drachm.
	Fine Iron Wire, . .	six drachms.
	Pure water, . . .	q. s.
	Hyposulphite of Soda .	two drachms.

Place two ounces of the iodine with five ounces of water in a glass flask or prescription bottle, add the iron gradually, and shake, unless the mixture becomes too warm, until a pale green solution is obtained. This pour off into a tincture-bottle marked at the point indicating twenty fluid ounces. Add the last drachm of iodine and agitate until dissolved. Rinse out the first flask with some water, which is added to the iodine solution. Then dissolve the hyposulphite of soda in enough cold water, and add it gradually to the solu-

tion of iron until the latter, under shaking, is discolored. Dilute to twenty ounces, and filter in a glass-stopper bottle. If two drachms of hyposulphite are insufficient to discolor, it is a proof of its impurity, and more should be added until the result is attained. If too much has been added, it will precipitate some very finely divided sulphur, which may be re-dissolved by the addition of a little iodine. The solution before filtering is best left standing over night, when all excess of hyposulphite will have been decomposed by the free hydro-iodic acid present.

The excess of iodine and the hyposulphite of soda are added in equivalent proportion, in which they form hydro-iodic acid and tetra-thionate of soda, the salt of the acid which does not precipitate the salts of baryta. This soda salt is perfectly inert, but insures the permanency of the proto-iodide to a remarkable degree. It may be passed through a number of filters without being oxidized. It may be sweetened by substituting syrup for part of the water, which, however, does not improve its appearance or permanency. The dose need not be reduced from that of the officinal, though containing slightly more iodine.

In addition to the above remarks, the writer will give what appears to him much needed in our pharmacopœia; that is, simple qualitative and quantitative tests for iodine and iodide of potassium.

The presence of water and cyanide of iodine in commercial iodine is found by the tests described in the Dispensatory. The presence of chlorine must be suspected when the iodine imparts a brown color to water. It is found by heating a strong solution of a neutral persulphate of iron, (iron alum) free from chlorine, with the iodine until no iodine appears to be dissipated, when the solution of iron will give a precipitate with nitrate of silver if chlorine was present in the iodine.

We have two very accurate tests for free iodine, founded on the oxidation of arsenite of potassa to arseniate, and of hyposulphite of soda to tetra-thionate.

A test solution of arsenite of soda or potassa, for the use of the pharmaceutist, is prepared after the manner directed for Fowler's Solution, using 70 grains of acid and 140 of bicarbonate of potassa to one quart or two pounds (avoirdupois) of test-liquid. The iodine to be examined, say five grains accurately weighed, is placed in a porcelain mortar with a little bicarbonate of potassa or soda, and a drachm or so of the solution of arsenite from a vial previously tared on a balance. A few drops of a solution of starch are then added, and rubbed up with the iodine, and then the solution of arsenite slowly, and towards the end drop by drop, until the blue color of the starch all at once disappears. The difference in the weight of arsenite of potassa is then an accurate measure of the quantity of pure iodine. One hundred grains of the solution are equivalent to 1.269 grains of pure iodine.

The solution of hyposulphite of soda is prepared by dissolving 350 grains of the salt in water, and dilute to one quart or two pounds avoirdupois. The

iodine, when to be examined by this test, must first be dissolved in iodide of potassium, after which the reaction goes on as with arsenite of potassa. One hundred grains being equivalent to 1.269 grains of pure iodine. These solutions are very dilute, and by the comparative largeness of the dose needed for small quantities of iodine, a great margin is left. The above solution of arsenite serves as a measure for hypochlorite of soda, chlorine and chloride of lime. It is added to a known quantity of these substances, until a drop of the mixture ceases to produce a blue spot on white paper sized with iodide of potassium and starch.

Regarding the qualitative tests of iodide of potassium treated on in the Dispensatory, it must be added that the solution of the salt must be dilute when tested with sulphuric acid and starch; for strong solutions disengage the iodine at once. The test described for chlorine contained in iodine, is equally as well applied to iodide of potassium. The persalt of iron must be perfectly free from chlorine. The resulting solution of iron treated with chlorine water and ether shows bromine, if present. In Personne's test for bromide, the sulphurous acid is advantageously replaced by hyposulphite of soda. Iodate of potassa is present when, on the addition of pure hydrochloric acid, free iodine makes its appearance.

The quantitative test of Marozeau, as described by Mr. Maisch some years ago, is sufficiently accurate for the purposes of the pharmaceutist. The quantity of iodate in a sample is found by adding some hydrochloric acid and determining the quantity of iodine set free by the solution of hyposulphite of soda, described above. For each six equivalents, or 7.6 (seven $\frac{6}{10}$) parts of iodine found, put 2.14 parts of iodate of potassa.

ON THE PROBABLE INFLUENCE OF ISOMERISM ON THE THERAPEUTIC POWER OF SUBSTANCES.

BY ISAAC CODDINGTON.

Professor Mapes has advanced a doctrine, worthy of attention — "On the progression of primaries in nature." — He suggests the applicability of the law to Materia Medica; the subject should therefore be interesting to this Association.

Professor Mapes asserts, that every substance in nature, as it is taken up in organic life, undergoes a change, and acquires new properties or functions in its relations to other organized substances, which it did not possess in its lower state of being; that for instance, potash from the ashes of plants will be food for plants of a higher condition, while potash from feldspar, although perfectly identical when tested by chemical reagents, is capable of nourishing the lowest order only of vegetable life, such as mosses, lichens, etc.

Similar views are attributed to Professor Joseph Le Conte, who read a paper bearing on this subject, before the Society for the Advancement of Science, — "On the correlation of chemical and physical forces," — which has not yet been published.

Now, may not this law explain the efficacy of cod liver oil — the superiority of natural mineral waters, — and serve to reconcile discrepancies in the efficacy of certain medicines — the hypophosphites, for instance?

I have briefly presented this subject as one coming within the scope of our investigations and calculated to possess some practical interest.

ON THE SPECIFIC GRAVITY OF WATER AT DIFFERENT TEMPERATURES.

BY W. H. PILE, PHILADELPHIA.

As a small contribution to science, I present to the Association the following tables on the specific gravity of water at different temperatures, collected from various sources, and comprising my own observations on the same subject.

By way of introduction, I may state that it has been a matter of necessity with me to have a table of this kind, in order to graduate my specific gravity bottles at any temperature, without the trouble and uncertainty of reducing the water to 60° F. artificially, which, in very warm weather, would vitiate the results, by the deposit of moisture on the outside of the glass bottle, as well as from the rise of temperature during the process of weighing.

Having examined and compared together several tables by different authors, I was struck by the discrepancy between them; so much so that I thought it better to construct a table for myself, particularly as my object was merely to ascertain the weight of a 1000-grain bottle, filled with pure water at different temperatures, without taking into consideration the expansion of the glass bottle.

The experiments were made throughout the year, at the varying temperatures of the season, ranging from 50° to 96°, and comprise a large number of observations. These were finally collected together, averaged and arranged.

In order to compare my experiments with the others, I have corrected the results which I obtained, by allowing for the expansion of the glass bottle.

According to Lavoisier and Laplace, flint glass expands for each degree of Fahrenheit $\frac{1}{224640}$ of its length. By the necessary calculation it will be found that its cubical dilation will be such that a bottle containing 1000 grains of water at 60° F., will contain nearly .013 grains more for each degree above that temperature. Therefore, to obtain the true specific gravity of water from its weight, as observed in the bottle, it is only necessary to subtract .013 grains for each degree above 60° F., and to add that quantity for temperatures below 60°.

I may also observe that the discrepancies between the tables are much more apparent when water is assumed to weigh 1000 at its greatest density (about 40° F.) than when it is reckoned to weigh 1000 at 60°, as in the annexed tables; in the former case, the variation commencing 20° lower in the scale.

The tables which I have collected, have all been calculated and reduced to

the same standard, viz.: water at 60° F. = 1000. This has occupied considerable time, from the fact that the original observations are reckoned from different points, and with different thermometric scales.

Thus in Kopp's table of the expansibility of water, the specific gravity of the water was first calculated from its observed expansion; next, the results were reduced from Centigrade to Fahrenheit's scale; and lastly, as Kopp assumes water at 32° F. to equal 1000, the results were again reduced, so that water at 60° should equal 1000.

TABLE No. 1. — Reduced from Kopp's table as above stated. (Vol i. of the Cavendish Society's Works.)

TABLE No. 2. — Tralles' table for every 5°, the intervening degrees being interpolated: Water at 40° = 1000. (Ure's Dictionary, Art. Alcohometry.)

TABLE No. 3. — Hallstrom's table for every 9°: Water at 39·38° = 1000. (Booth's Cyc. of Chem.)

TABLE No. 4. — Despretz's table of the expansibility of water: Water at 4° C. (39.2° F.) = 1000. (Journal de Chem. et Phys., vol. lxx., 1837.) Contained in a very able and lengthy paper, giving all the details of the numerous experiments on the subject.

TABLE No. 5. — Hassler's observations, collated and reduced by J. H. Alexander: Water at 40° = 1000. (Silliman's Journal, vol. xvi., 1853.) These experiments were originally published in a congressional document (1832) in a report on the comparison of weights and measures, and are stated to have been made on a very large scale.

TABLE No. 6. — My own observations, corrected for the expansion of the glass bottle, as previously remarked.

Temp. Fahr.	1 Kopp.	2 Tralles.	3 Hallstrom.	4 Despretz.	5 Hassler.	6 W. H. Pile.
32°	1000.78	1000.80	1000.69			
33°	.80	.83	.71			
34°	.83	.85	.73			
35°	.85	.87	.75			
36°	.87	.88	.77			
37°	.88	.88	.78			
38°	.89	.89	.79			
39°	.89	.89	.80	1000.95		
40°	.90	.90	.80	.95	1000.63	
41°	.89	.89	.80	.94	.63	
42°	.88	.89	.79	.94	.63	
43°	.87	.88	.78	.93	.63	
44°	.85	.88	.77	.91	.62	
45°	.83	.87	.75	.88	.61	
46°	.80	.85	.73	.85	.59	
47°	.77	.83	.70	.82	.57	
48°	.73	.80	.66	.78	.55	
49°	.69	.76	.62	.74	.52	
50°	.65	.70	.58	.69	.49	1000.67

Temp. Fahr.	1 Kopp.	2 Tralles.	3 Hallstrom.	4 Despretz.	5 Hassler.	6 W. H. Pile.
51°	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
52°	.60	.65	.54	.64	.46	.62
53°	.55	.59	.49	.59	.42	.56
54°	.50	.53	.44	.53	.38	.50
55°	.44	.46	.39	.46	.34	.44
56°	.37	.39	.33	.39	.29	.37
57°	.31	.32	.27	.32	.24	.30
58°	.24	.25	.21	.25	.18	.23
59°	.16	.17	.14	.17	.13	.16
60°	.08	.09	.07	.09	.06	.08
61°	999.91	999.91	999.93	999.91	999.93	999.91
62°	.82	.82	.85	.81	.86	.82
63°	.73	.72	.76	.71	.78	.72
64°	.63	.62	.67	.60	.70	.62
65°	.53	.51	.57	.49	.63	.53
66°	.43	.40	.47	.38	.53	.43
67°	.32	.29	.36	.27	.44	.33
68°	.21	.17	.25	.17	.35	.23
69°	.10	.05	.14	.06	.26	.12
70°	998.98	998.93	.03	998.95	.16	.01
71°	.86	.81	998.91	.84	.05	998.90
72°	.73	.69	.79	.72	998.95	.78
73°	.60	.56	.67	.60	.84	.66
74°	.48	.43	.55	.47	.72	.53
75°	.34	.30	.42	.34	.60	.40
76°	.21	.17	.29	.20	.48	.27
77°	.07	.04	.16	.06	.36	.13
78°	997.93	997.90	.02	997.91	.23	997.99
79°	.79	.76	997.88	.76	.10	.83
80°	.65	.61	.74	.61	997.96	.68
81°	.50	.46	.59	.45	.82	.52
82°	.35	.31	.44	.29	.68	.35
83°	.20	.16	.28	.13	.54	.18
84°	.05	.01	.16	996.97	.39	.01
85°	996.89	996.85	996.96	.81	.23	996.83
86°	.73	.69	.79	.65		.64
87°	.57	.53		.48		.46
88°	.40	.36		.31		
89°	.23	.19		.14		
90°	.05	.01		995.97		

ON THE USE AND APPLICATION OF CATAWBA WINE IN PHARMACY AS A MENSTRUUM.

BY ZIMMERMANN & CO., OF CINCINNATI.

To the Members of the American Pharmaceutical Association.

Grape-juice or must, is a composition of "water, sugar, gum, grape-oil, wax, gelatine or pectin, extractive, coloring, and glairy vegetable, albumen, and gluten matters, various acids and salts." Under certain conditions it is partly changed by chemical decomposition into new chemical combinations. The glairy matters at first change by oxidation into "lees," and this comes in a peculiar motion-state called "spontaneous decomposition," which attacks principally the sugar, dividing it into alcohol, carbonic acid, and other elements. After this process (fermentation), which is gone through in the course of some weeks, the juice then is called "wine," and consists of "water, sugar, alcohol, tartaric, acetic, tannic, phosphoric, carbonic acid, extractive, coloring and glairy matters, œnanthic ether, various fragrant compounds, cream of tartar and other salts, etc." When the fermentation stops, the most part of the cream of tartar, tannic acid combined with albumen, lees, and other insulated substances are settled, and the clearness and color takes place, which last differs from gold, up to purple, red, and chestnut-brown, according to the quantity of coloring matter, acids, and decomposed tannic acid (Apothema) the wine contains.

As soon as the warm temperature sets in again, the wine makes a second fermentation, and undergoes, after this, a continually changeable state. By keeping in oaken vessels, it evaporates mostly water through the pores, and the result is an increase of alcohol, tartaric acid, etc., and the precipitation of a new part, cream of tartar; besides this, a small portion of tannic acid, quercin, etc., is extracted from the wood. At the same time several other slow and mild processes happen, causing a separation of a small part of ether from alcohol, a combination between acetic acid and ether, and a decomposition of the œnanthic ether, tartaric acid, tannic acid, into fragrant compounds, and less acid substances. The wine, therefore, will be, till a certain age, very high flavored, palatable, and darker in its color; though by reaching a higher age, it loses all this agreeable advantage, because every composed organic substance becomes decomposed finally into water, ammonia, carbonic acid, and ash.

According as the quantity of sugar, carbonic acid, or alcohol predominates, the wine will be classified in "*dry* (sour,) *sweet* or liquor, and *sparkling*." This depends upon the species of the grape-vines, especially upon the manner of preparation; thus, while the dry wine is prepared without any addition or artificial help, the liquor-wine, is by artificial concentration of the grape-juice, by boiling or addition of sugar and often brandy; and the sparkling wine by addition of liquor (sugar dissolved in brandy), before and after the

second fermentation in closed bottles, and by keeping the developed carbonic acid.

There is a difference in the taste of the consumers, of course, and therefore it is hard to say which kind of wine may have the preference. *Dry wine* has more flavor than the others, as much as it is more advantageous for the sound human organism. *Liquor wine* contains more alcohol, tastes sweet and aromatically at once, and is a very valuable drink for all convalescents, whose organism needs phosphorous; then, if prepared by concentration, the grape-sugar contains a large quantity of phosphoric acid, (Malaga and Tokayer, for instance, contains nearly five per mille,) and can safely be kept by all seasons on draught or in bottles without change. The *sparkling wine* is favored by its agreeable refreshing character and stimulating taste.

Among the improved native grapes, the "Catawba" is considered the best for making a dry wine, and is now chiefly cultivated in the West. The grape, as well as the soil and climate — all natural circumstances — are favorable to the American wine culture, and if it is sometimes poor, it is due to preparation and the dishonesty of the wine-growers and the wine-dealers.

Good wine requires a perfectly ripe grape, a careful grape-gathering, and a skilful manipulation through the processes of pressing, fermentation, and keeping. The most of the growers do not follow this prescribed method, because they want more skill, and a better wine costs a good deal more labor and loss, which is not proportionally paid by the consumers.

It seems to be a greater fault, however, in the existence of cheating and adulterating of the product, actions which are done everywhere and to everything in our country, as Mr. C. B. Gurthrie has shown in his report on home adulterations, published in the Proceedings of your honorable Society of 1858, page 58.

We have analyzed many samples of Catawba wine, from every vintage for ten years, and find that a pure and good kind must have, "8 to 12 per cent. alcohol, 1.5 to 3.5 per cent. extract, (what is left by evaporation) 0.15 to 0.25 per cent. ash, and 0.5 to 1.0 per cent. acids." If the constituents are found outside of this analytical line, the wine is either poorly prepared, or not pure.

In regard to the above extravagances, there is nothing astonishing, when laughter meets any body who feels an enthusiasm about the Catawba wine; however, it should not be overlooked that the wine adulteration, or artificial wine-making, also exists in Europe very extensively, and it would be more profitable to open the eyes a little more when looking across the ocean.

It is known that the annual average wine crop in Europe is about 1500 millions of gallons, and, nothwithstanding, this quantity is not large enough to satisfy the general European wine thirst; but, in the greatest failure of the wine crop there is no scarcity at all; for the skill "to juggle a cheap Hungary red wine into a dear French Bordeaux, or a very inferior wine into a very good

one, and to multiply the quantity," has already found its home at France, and is confirmed by scientific journals. Germany, with its "wine improvements, or artificial wines, from *Dr. Gall* and *Dr. Leuchs*, is a worthy neighbor to France; Spain and Portugal are unable to find all the brandy they use in the preparation of wine, and England raises all species of European grapes in form of apples, potatoes, prunes, turnips, &c."— and there exist almost as many wine as beer breweries, which operate jointly, so that the prepared beer may be the basis for the celebrated Madeira, Malaga, Sherry, Port wine, &c. Since the appearance of the said report of Mr. Guthrie, we do not hesitate to say that pure Sherry wine, used in American Pharmacy as a menstruum, is, in America, even so much a rarity as pure Catawba wine in Spain; and, if it is so, every American should feel disposed to use the home product, for this purpose solely, in a pure state, instead of an English raisin or beer preparation; the more, as the yield of the coming grape crop will be, in the States of Ohio, Kentucky and in Indiana only, over *three millions* of gallons.

Pure Sherry wine contains 14 to 17 per cent. alcohol, 0.3 to 0.5 per cent. acids, and a certain quantity of sugar; if it contains no acids and sugar, it is artificially made, as every natural wine must contain them.

The Catawba wine has not only more acids, but also a lower degree of alcohol, and it is not possible to increase them in the way by which the liquor wines are made, namely, by concentrating the grape sugar; for there is against this — (a,) the high cost in making, and (b,) the large quantity of acid which always impairs the wine. The Catawba grape produces more acid than any other kind of grape known, and *Bérard* has shown that, in ripening of grapes, and other fruits, no acid is changed into sugar, and the acid is only lessened, on a small scale, by neutralization of the inorganic components, which are produced at the same time.

All the acids, except the tannic acids which exist in the grape skins, and acetic acid, which is developed only during the fermentation, and the acid salts are existing in the juice itself, so that, by a slight pressure of the grapes to obtain the juice, the quantity of acid is always so large that it does not suit the purpose.

In order to reach the purpose, however, there must be made an addition of about a third of sugar water to the juice, of the same consistence as the grape juice itself, and, after fermentation, a necessary quantity of Catawba brandy. Only natural constituents are here added, for water and alcohol are throughout the same, and the Catawba brandy contains the volatile components from the Catawba wine, as we have shown in a communication on the same subject. The quantity of acid is reduced, and a certain part of cream of tartar precipitated. The glairy matters are perfectly sufficient to decompose the sugar, and there will be found always a "bouquet" which at least compares to that from every kind of wine artificially made.

This question was considered in an able report by Fred. Stearns, published

in the last year's Proceedings, page 379. It is very important as a *substitute*, of a *foreign* by a *native* product, as a menstruum, entirely equal in its chemical components; also to the American wine culture, because pure and new Catawba wine has too much acid, and wants, therefore, age to lose it, before it is fit as a worthy and healthy beverage.

By the said manner of preparing (excluding the addition of brandy), we have a cheap, good and drinkable wine. The Catawba wine generally may be highly recommended.

ON THE APPLICATION OF CATAWBA BRANDY IN PHARMACY.

BY ZIMMERMANN & CO., CINCINNATI.

By an invitation of the Maryland Pharmaceutical Association, Mr. John Zimmerman, of our firm, read, at one of their meetings in April last, a paper upon the various methods used in the manufacture of Catawba brandy. This paper was published in the June number of the "Maryland Pharmaceutical Journal," the "Peninsular and Independent," the "American Journal of Pharmacy," the "Druggist's Circular," &c.

In the first named paper it was accompanied with the following editorial remarks:—

"For our own part, we think it matters very little whether the alcohol in brandy is derived from the fermentation of grape juice, grain, or sugar, so that it is properly purified before being colored and flavored. We do not feel disposed to enter into a discussion of this question, but we must say that we differ in opinion with Mr. Zimmerman, when he says that the great 'medical value of old grape brandy' (in the paper it ought to be read 'new,' instead of 'old,' said error is corrected in the New York 'Druggist's Circular' of July, page 157, by J. F.) 'consists in the ænanthic ether, which it contains.' We will, however, be open to conviction, when more light is thrown upon the subject."

In consequence of this and other remarks advanced in opposition to our views, we feel constrained to address to your Honorable body the following communication:—

The various kinds of brandy are generally distinguished by so-called "fusel-oils," compounds of nauseous smell, consisting of ethereal oil, sebacic acid, and various kinds of alcohol, which are mostly developed by fermentation, during the production of lees, and the peculiar smell and taste which they impart to the distillates, differs with the material used by their production.

Wine-fusel-oil is obtained by distilling wine, lees, and grape marc, (materials already by J. Z. explained) and consists mostly of ænanthic acid and ænanthic ether, while, for instance, corn-fusel-oil has still a third ingredient, a thick oily matter, called "corn oil," or oleum silicium, and the principal component part of potato-fusel-oil is "amyle alcohol."

The effect of all fusel oils upon the human organism is as injurious as their smell is bad; this can be said with special reference to amyle alcohol, which is very nauseous, and provokes coughing. They are, nevertheless, of incalculable value to practical chemists, and for liquors, because the chemist frequently use them to prepare birch, apple, wine, cognac, oils, &c., and the wine-fusel-oil, mixed with alcohol, does not only give to the wine its peculiar smell and taste, but also produces the most prominent, high flavored, combinations in wine, usually called its flavor, (bouquet) which is formed by sebacic ethers and some species of sebacic alcohol, as, for instance, butyric, capronic, caprinic ether, and amyle, propryle alcohol, &c., and thus sebacic acids are especially produced by the chemical decomposition of "ænanthic acid."

Mulder, in his "Chemistry of Wine," (edited by H. Bence Jones, London, 1857, pronounced as the latest issue in this line of science, which can be highly recommended,) has given sufficient information as to the nature and origin of vinous smell, common to all wines, and the flavor peculiar to each wine. He has shown that the fragrant volatile alkali in combination with a volatile acid, to form the flavor of the wine, mentioned by Winkler, and endorsed by Mr. *E. S. Wayne*, does not exist in wine at all. This circumstance explains the fact why young and ill-flavored wine, (such, for example, can be frequently found on the river Rhine, called "Boekser,") in which ænanthic ether predominates, and which, if drank oftener and in larger quantities, produces nausea and headache; after a lapse of years, however, it becomes fragrant and healthy, just as well as wine-brandy advanced in value with its age. The reason therefore is, why wine-brandy is more pleasant and preferable to all alcoholic distillates, that it contains fragrant combinations of ethers, by which its price and medical value is measured.

This combination of ethers, however, can only originate by the presence of certain substances in wine, as, for example, tartaric acid, and they receive still more prominence and strength when the slow disappearance of the ænanthic ether takes place.

Wine-brandy consists of water, alcohol, acetic acid, (which changes in a course of time in acetic ether) fusel oil, (but only up to a certain age) and fragrant compounds; all other substances found in it have been either accidentally or designedly added. Among these often will be found burnt sugar, and, when kept in oaken vessels, a small quantity of tannic acid, quercin; &c., is extracted.

In reference to the various methods to manufacture Catawba brandy, we refer to the remarks made by our John Zimmermann, published in the above named Journals.

Mr. E. S. Wayne in his views on Catawba brandy, published in the July number of the Cincinnati Druggist, page 59, in substance says:—

"That Catawba brandy, from grape marc, distilled with or without fermented sugar, is an entirely different product from brandy made of wine."

It is well known that in France inferior kinds of wine are only used to manufacture the *best qualities of brandy*, (cognac) as there is always a better market for good wines than there is for the distilled product.

Mr. Wayne maintains that brandy which is pharmaceutically or medicinally used should be a spirit derived only from *natural wine*, and all others — for example: distilled from grape marc, lees, both single or mixed together, with or without additions of alcohol or fermented sugar, to replace, direct or indirect, the alcohol lost by taking away with the grape juice, for other purposes — he classifies to the alcoholic liquids flavored, low priced or mixing brandies, unfit for medicinal use.

Mr. Abel Petiot, of Chamirey in Burgunot, (France) states, in a published report, that in two years an importation of alcohol of twenty-four millions of francs, (alcohol derived from potatoes is, from the German states, largely exported into France) was the cause of the grape crop failure in 1855 and 1856, when partly used only to manufacture brandies; a *true wine* brandy, for pharmaceutical and medicinal use, must be a rarety, even in France.

By a mixture of *water*, *sugar*, *lees*, *grape marc*, and *inferior kinds of wine*, in a certain proportion, an inferior wine is obtained, after fermentation, fully identical with a *natural wine*, and in consequence thereof the distillate from both is, in its chemical character, perfectly alike.

To the above assertion, which is fully confirmed, we refer to the August number (1857) of the "Bulletin de la societié d'Encouragement," page 559, and to "Quigler's Polytechnic Journal," for 1858, vol. 147, page 61,

However, the grape marc and lees, subjected to distillation, have no other source from which to generate alcohol, except from the *natural wine*, which still remains in them, and though it must be conceded that, by this process, more of the fusel oil is gained; and that, especially, brandy made of grape marc only, when new, is remarkable for its exceedingly sharp smell and taste, but it ought, nevertheless, not to be overlooked that, whatever there is in it, too much of the fusel oil can be removed by repeated distillation, *that this fusel oil is chiefly the original cause of the flavor*, and that its rank and sharpness disappears by age.

In the chemical character of such brandy there is no essential difference, and a difference in value only, if there is any, as far as there is a difference in the skill of the distiller, and in the age.

It is, therefore, nothing to oppose to the suggestion of Mr. Fred. Stearns to use the Catawba brandy as a menstruum in Pharmacy.

The truth can be practically ascertained by comparing hot punch, or soda water in which plain syrup will be mixed, with the brandies.

The fault, however, is, that well prepared and old Catawba brandy is very scarce. To this Mr. Wayne has called attention as early as 1855, and latety again in the "Druggist."

To detect an imitation of the Catawba brandy made from rectified whiskey, we recommend L. Molnar's reagent.

Genuine Catawba brandy must be fiery, and have the smell of the Catawba wine; if mixed with clear water it must be retained clear; and if evaporated nothing has to remain, except, perhaps, some sugar, and the extracted substances of oakwood; newly distilled, it is colorless, and can thus be kept in glass; if kept in oakwook, the tannic acid, which is extracted, is chemically transformed into apothema, which colors it yellowish; artificially it is colored with burnt sugar.

COMPARATIVE ANALYSIS OF "PRICE'S" AND AN AMERICAN GLYCERINE (PROCTER & GAMBLE'S, CINCINNATI, OHIO).

PRESENTED BY A. CUSHMAN.

The following analysis, by Prof. Campbell Morfit, may possess some interest. The appearance of the American product is very handsome, perhaps quite equal to that of Price's; and its density is the same. Its price is less than half. It retains a very slight unpleasant odor, but not sufficient to prevent its use in liniments or ointments, where the smell is not important.

	50 to 60 Cts. per lb.		$1.20.	
ANALYZED BY CAMPBELL MORFIT.	PROCTER & GAMBLE'S GLYCERINE, Cincinnati, Ohio.		PRICE'S ENGLISH GLYCERINE.	
	Neutral to Test-paper, but slightly odorous.		Acid to Test-paper, but nearly inodorous.	
SPECIFIC GRAVITY.	12.507.		12.512.	
COMPOSITION.	Per cent. Grains.	Per pound. Grains.	Per cent. Grains.	Per pound. Grains.
Water,	8.080	565.600	7.750	542.500
Glycerine, absolute,	91.414	6398.980	92.244	6457.080
Chlorid Calcium,	trace.	trace.	Total inorganic matters, .006.	.420
Chlorid Magnesium,	trace.	trace.		
Chlorid Sodium,	.259	18.130		
Chlorid Potassium,	.063	4.410		
Sulphate Zinc,	.184	12.880		
Carbonate Ammonia,	trace.	trace.		
Butyrate, Caporate, and Valerate of Lime, with a peculiar volatile organic matter,	trace.	trace.		

DRUG MILL.

The accompanying engraving represents a new Drug Mill, from the Messrs. Tilden, of New Lebanon, N. Y.

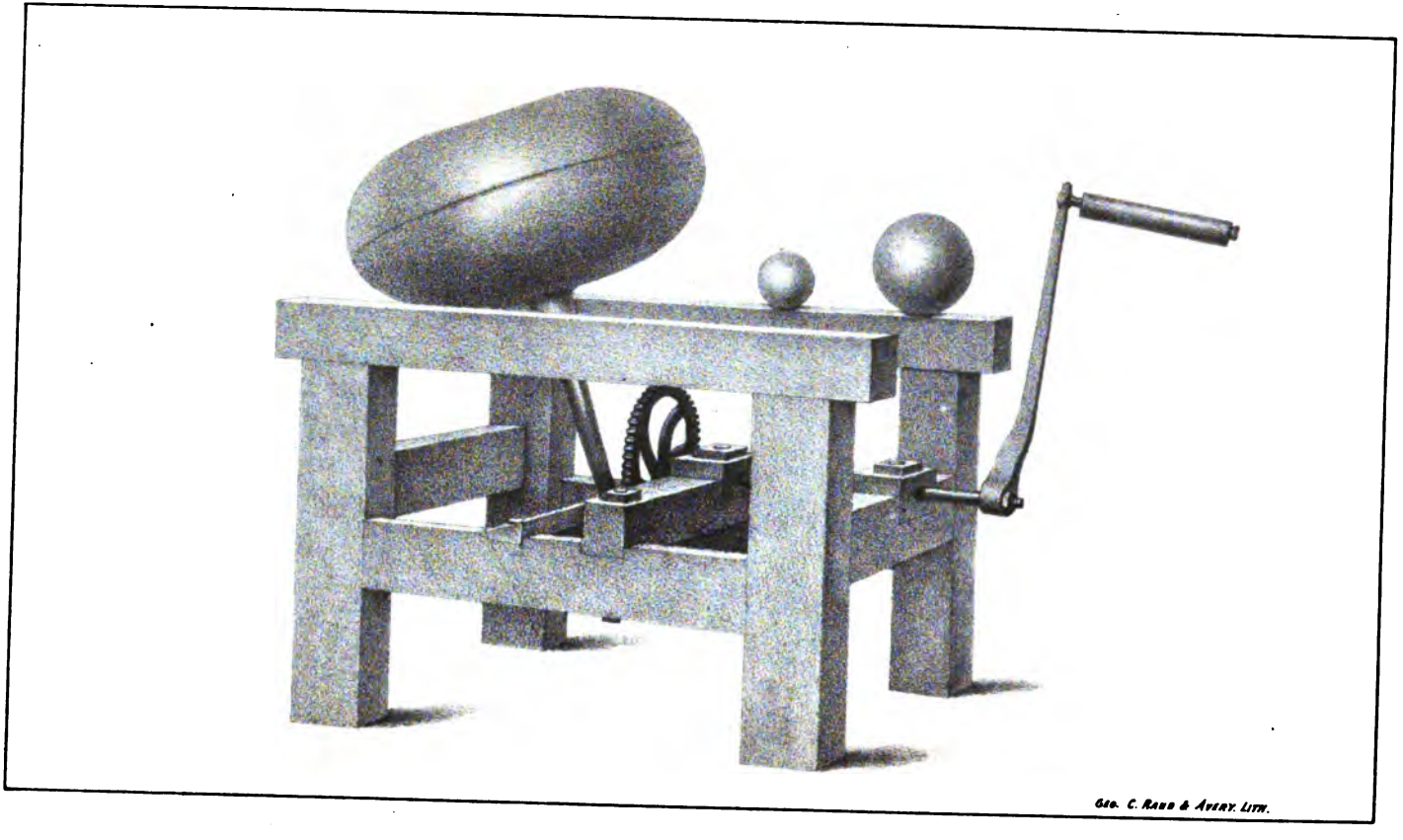
The advantages claimed for it are, that it can be easily available to any Pharmaceutist for powdering small quantities of drugs, economises labor, and is not expensive in cost.

It is also well adapted to be used in mills where steam or water power is available.

It consists of a hollow spherical chamber, attached by its rod to gearing which gives it a rotary motion.

The balls, or "chasers," (shown in the engraving upon the frame work) are placed in the hollow chamber, together with any article which it is desired to powder, and, by the rotary motion imparted to the machine, the required state of comminution is easily arrived at.

It is said to answer very well for Pharmaceutist's use.



Geo. C. Rand & Avery, Lith.

APPENDIX.

CORRESPONDENCE OF THE U. S. PATENT OFFICE.

[Continued from p. 30.]

U. S. PATENT OFFICE, July 25th, 1859.

SIR: — Agreeably to the request contained in your communication to the Honorable Paul Leidy on the 16th of January last, herewith I inclose a paper from Mr. D. J. Browne, on the introduction of the tree producing the Peruvian bark.

In accordance with your suggestion and the information embraced in the paper mentioned above, please to procure a sufficient quantity for experiment of the capsules containing the seeds of each of the three varieties of the Peruvian bark tree, the "Pale," the "Yellow," and the "Red," and cuttings of the same, put up in the manner indicated in the accompanying communication, * * * * ship the same to New York, forward duplicate bills of lading by mail, and draw on this Office for the cost.

I have the honor to be
Your obedient servant,
WM. D. BISHOP, Commissioner.

Hon. C. R. Buckalew, Minister Resident, Quito, Ecuador.

U. S. PATENT OFFICE, July 25, 1859.

SIR: — In a communication addressed to the Honorable Paul Leidy of the House of Representatives, 35th Congress, by His Excellency C. R. Buckalew, Minister Resident near Ecuador, and referred to this Office, I am requested to act in concert with the last named gentleman, to take the necessary steps towards the introduction of the tree producing the Peruvian bark of commerce. The vast importance attached to the use of this material and its preparations as a febrifuge in all parts of the country where intermittents prevail, seems to be a sufficient inducement to attempt its naturalization in our soil, and, if successful, to extend its culture to such parts of our territory as would yield it in abundance, and at the same time, be profitable to the producer. From the apparent hardiness of this tree, thriving as it does in the mountains near Loxa, in Ecuador, at elevations 6000 to 8000 feet above the level of the sea, there can be but little doubt of its adaptation to the climate of some parts of California, and even in favored localities, to that of the Southern States. Additional reasons might be given for its introduction, from the circumstances that this substance is becoming scarcer every year, even threatening an extinction of the tree itself; is subject to mercenary adulterations, and annually draws large sums from the country for its importation, the amount paid during the fiscal year, ending June 30, 1858, for quinine, quilla, and Peruvian bark being $813,184.

Besides, an infusion of the green bark, according to Dr. Von Tschudi, as a remedy against intermittent fever, is much more efficacious than when dry, as less than half the usual dose produces, in a short time, convalescence, and the patients are secure against return of febrile attacks. If cultivated in this country, the bark, in its green state, would be more efficient in its effects than the adulterated article which we are so often under the necessity of employing.

Cinchona bark appears to have been long known as a medicine in Peru; but we have no satisfactory account at what period, nor by what means, the febrifugal virtues of this valuable remedy were first discovered. Some say, a patient had been cured of an intermittent fever by having drunk the waters of a lake which had acquired a bitter taste from Cinchona trees which had lain in them; others, that a lion had cured himself of the ague by instinctively chewing this bark, and thus directing the attention of the Indians to this tree. "That animals," observes Humboldt, in his Dissertation on the Cinchona Forests of South America, "have taught men, is a very common form of the traditions of nations. The valuable antidote *Bijuco del Guaco*, a plant described by Mutis, which is related to the *Mikania*, and has been erroneously confounded with the *Ayapana*, of Brazil, is also said to have attracted the notice of the Indians, as is affirmed by the *Falco Serpentarius*, by the *Falco Guaco*, of New Grenada, fighting with serpents. However, that the great American lion, without mane, (*Felix concolor*,) should be subject to the ague, is just as bold an hypothesis as the assertion of the inhabitants of the pestilential valley, Guella Camba, (near the town of Quito,) that even the vultures, (*Vultur aura*,) in their neighborhood, were subject to that disorder. The story, so often copied, respecting the Countess Chinchon, Vice-Queen of Peru, is probably still more doubtful than it is generally supposed to be. There certainly was a Count Chinchon, Don Geronimo Fernandez de Cabrera Bobadella y Mendoza, who was Viceroy of Lima, from 1629 to 1639. It is very probable that his wife, after her return to Spain, in 1640, was the first who introduced the Cinchona bark into Europe. In Loxa, an old tradition is current, that the Jesuits, at the felling of the wood, had distinguished, according to the custom of the country, the different kinds of trees by chewing their barks, and that on such occasions they had taken notice of the considerable bitterness of the Cinchona. There being always medical practitioners among the missionaries, it is said they had tried an infusion of the Cinchona in the tertian ague, a complaint which is very common in that part of the country."

Although several species of the genus to which this tree belongs afford the quinine and Peruvian bark of the shops, only three are admitted into the Pharmacopœias, namely, the "Pale-barked," (*Cinchona lancifolia*,) the "Yellow-barked," (*Cinchona cordifolia*,) and the "Red-barked," (*Cinchona oblongifolia*.) The former is described by Humboldt under the name of *Cinchona condaminea* as a handsome evergreen tree, 30 to 40 feet in height, and standing generally single, and exuding, wherever it is wounded, a yellow, astringent

juice. The trunk is about 18 feet in height, and fifteen inches in diameter, erect, with a cracked, ash-colored bark. The branches are round, in opposite pairs, erect, brachiated, with the younger ones obscurely quadrangular at the sides. The leaves are of a light green, shining, ovate-lanceolate, about three inches long, petiolate, with a little pit in the axillæ of the nerves, or the under surface, which is filled with an astringent, aqueous fluid, and having the orifice shut with minute hairs; they stand on short foot-stalks, one-sixth of their length, flat above and convex below; but the form of the leaf varies extremely, so that no specific distinction can be derived from their figure alone. The stipules are two, acute, sericeous, contiguous, and caducous. The panicles are terminal, branched, leafy, and trichotomous. The flowers are of a pale rose-color, furnished with little bracteas, and are produced in terminal, brachiated, leafy, trichotomous panicles, supported on round peduncles and pedicles, which are powdered and silky. The calyx is bell-shaped, globular, five-toothed, powdered, and silky, like the peduncles, with the teeth ovate, acute, very short and contiguous. The corolla is somewhat salver-shaped, longer than the calyx, with the tube obscurely five-angled, silky, frequently of a rose-color; the limb wheel-shaped, with linear-lanceolate segments, much shorter than the tube, white and woolly above. The anthers are twice the length of the free portion of the filaments. The germen is globular, with an erect style and bifid stigma. The capsule is ovate, woody, striated longitudinally, crowned with calycinal teeth, two-celled, many-seeded, oppositely twice furrowed, and opening from the base to the apex, with two valves.

Cinchona bark is stripped from the trunk and branches in the dry season from September to November. It is dried by exposure to the sun, and after being imported into Europe and this country is sorted for sale. It is usually transported in chests, each of which contains from 100 to 200 pounds, mixed with dust and other impurities. The basis of all the species is woody fibre, combined with which are various principles capable of being extracted by different solvents. The taste of all is more or less astringent and bitter. Boiling water extracts all their active principles, affording a solution of a pale brown color, which is transparent when hot, but on cooling becomes turbid, and a precipitate is deposited that is soluble in alcohol. By long boiling the virtues of the bark are nearly destroyed, owing to the chemical change and precipitation of its active matter. From the experiments of Vauquelin, Faqroni, and others, it appears that these principles are resin, extractive, gluten, a small portion of volatile oil, and tannin. Vauquelin discovered in some varieties of the bark the presence of a peculiar substance to which he gave the name of *Kinic acid.*

The following are the most important results which have been obtained by MM. Pelletier and Caventon, respecting the composition of the three officinal species.

1. In *pale bark* they found acidulous kinate of cinchonine, a green, fatty

matter, which they term "red cinchonine," tannin, a yellow coloring matter, kinate of lime, gum, starch, and woody fibre.

2. In *yellow bark*, they found that the alkaline base differs from cinchonine, in being uncrystallizable, very soluble in ether, and forming salts with the acids different from those formed by cinchonine. The chemical constituents of *yellow* are an acidulous kinate of this salt, which they have named "quinine," a deep yellow, fatty matter, red cinchonine, tannin, yellow coloring matter, kinate of lime, starch, and woody fibre.

3. *Red bark* contains acidulous kinate of cinchonine, kinate of quinine, reddish fatty matter, red cinchonine, tannin, kinate of lime, yellow coloring matter, starch, and woody fibre. The difference between the pale, the yellow, and the red barks, depends principally on the quantity of the two alkaline bodies, *cinchonine* and *quinine*, found in them. The pale bark contains cinchonine, but a very small proportion of quinine; the alkali, again, which predominates in the yellow bark, is quinine, while in the red bark, and some spurious kinds, there is a combination of both these substances.

A separation of the *cinchonine* from the pale variety, and of the *quinine* from the yellow, is a simple operation. It consists in digesting the bark, coarsely powdered in weak sulphuric acid, and then repeating the digestion with about half the quantity of this liquid, till all the soluble matter is extracted. To this decoction a small quantity of air-slacked lime is added, somewhat greater than is necessary to saturate the acid. The precipitate that ensues (a mixture of cinchonine and sulphate of lime) is collected, dried, and boiled for a few minutes in alcohol, which takes up the cinchonine, but will not dissolve the sulphate of lime. The solution is decanted off while still hot, and fresh portions successively added for the repetition of the operation, until it ceases to act on the residuum, which is then merely sulphate of lime. The different alcoholic solutions are then put into a retort, and considerably evaporated, during which, and on cooling, acidular crystals of cinchonine are deposited. By repeating the solution once or twice in boiling alcohol, and again crystallizing, the cinchonine will be obtained in a perfectly pure state, when it has an intensely bitter taste, and exerts the same action on the animal economy as the bark itself; but it is less generally used in medicine than quinine, the other active principle of the bark, because the yellow variety from which it is procured is more plentiful. Hence quinine is cheaper than cinchonine, and equally efficacious. *Quinine* may be obtained from the yellow bark in the same manner as cinchonine is prepared from the pale; or by adding an alkali to a solution of the sulphate of quinine. It is not crystallizable, like cinchonine, but on the application of heat melts into a kind of paste. It has a much more bitter taste, and is sparingly soluble in water.

I have been thus particular in describing the properties of the three principal species of the Peruvian bark, in order that the cuttings and seeds of the best may be obtained for experiment. Being a re-productive tree, it is probable

that the most expeditious mode of testing its adaptation to our soil and climate would be from cuttings taken from near the extremities of healthy branches, each a foot or more in length, and containing at least three eyes or buds. They should be severed from the tree in December and immediately packed closely, on the spot, where they grow in layers of earth sufficiently moist and friable for ordinary cultivation, in tin cases, and hermetically soldered or sealed. These cases, again, should be packed in wooden boxes, properly numbered or labelled, and forwarded with every possible dispatch to New York, where they should arrive as early as March, so that the cuttings may be started in a propagating house, preparatory to removing them to the sites where the experiments are finally to be made.

The seeds should be collected at the period of maturity from healthy trees, retained in their capsules, and well dried in the shade without the application of artificial heat. They should then be put up in paper or muslin bags, numbered or labelled, securely packed in boxes, but not hermetically, and kept in a dry condition during their passage to the United States.

In ordering from Ecuador a limited quantity of the cuttings and seeds of these trees, directing them to be packed and forwarded as above, I think there will be scarcely a doubt that the problem of producing this important material in this country can be thoroughly proved.

I have the honor to be your obedient servant,

D. JAY BROWNE.

Hon. Wm. D. Bishop, Commissioner of Patents.

Sept. 10, 1859.

[CIRCULAR.]

DEPARTMENT OF THE INTERIOR,
Office Indian Affairs, 185 .

SIR:

You are requested as soon as practicable to reply to the following inquiries to be used in preparing a report from this Office to the "American Pharmaceutical Association," viz:

1. What medical plants are used by the different Indian tribes in the vicinity of your agency?

2. The medical virtues ascribed by the Indians to them: whether emetic, cathartic, diuretic, diaphoretic, expectorant, anthelmintic, stimulant, narcotic, tonic, astringent, or anti-spasmodic. The diseases said to be cured, or alleviated by the respective plants?

3. In what latitude are they to be found?

4. In what quantities can they be obtained?

5. How near to navigable streams can they be gathered?

6. What facilities can be had for sending them to market?

This information you are requested to forward to this Office at your earliest convenience.

Very respectfully, your obedient servant,

Commissioner.

NEAR TAHLEQUAH, CREEK NATION, July 29th, 1859.

Col. George Butler, U. S. Agent for the Cherokees:

DEAR SIR: — Since you handed me the communication from the Commissioner of Indian Affairs, *ad interim*, the Hon. Charles E. Mix, in regard to the medicinal plants used by the Indians, I have brushed up my botanical knowledge a little (which had been almost totally neglected for many years,) and gleaned, from reliable sources, a few facts relative to Indian remedies. The Cherokees are the only aboriginal tribe of whose medical practice I know anything of consequence. I have travelled somewhat extensively among other tribes, but have had no opportunity of becoming thoroughly acquainted with their peculiar methods of treating diseases.

Before proceeding to answer the interrogatories propounded in the communication, I beg leave to make a few general remarks:—

At an early date of my acquaintance with the Cherokees, I soon perceived that their ideas of the nature of disease and the therapeutical application of remedies were extremely vague, and deeply tinged with superstition. This was in the rugged mountains of Western North Carolina, among the least enlightened portion of the tribe. At the present day, the Cherokees west of the Mississippi, (constituting, perhaps, nearly four-fifths of the whole,) in the aggregate, place vastly more reliance on regularly educated physicians, than on their old-fashioned practitioners. A comparatively few full-bloods who have been reared under the *ancient regime*, cling to many of the original customs and manners of the tribe, among which medicine was a conspicuous characteristic. In the treatment of diseases, such persons place far more reliance on charms, incantations, and various superstitious ceremonies, than in the operations of medicaments. It is true that they frequently resort to the use of medicinal substances; but they seldom do so without, at the same time, bringing into requisition the mysterious (and to them therefore powerful) aid of magic.

In the summer of 1842, I wrote out a meagre sketch of the "Customs and Manners of the Cherokees," which was published in a Knoxville, (Tenn.,) paper. For the purpose of illustrating the subject more fully, I will transcribe a paragraph.

"The Cherokees are extremely superstitious, believing in supernatural appearances, and in the power of magical incantations. They seldom trust to the operation of medicine alone in the cure of disease; but resort to conjurations with perfect confidence in their efficacy. Their conjurers pretend to have the power of ascertaining whether a sick person will live or die. After invoking an imaginary spiritual being, they cast beads, belonging to the sufferer, into a stream of water: if they swim, it is considered a good omen; if they immediately sink, the patient is looked upon as lost. After learning that a case will terminate favorably, they pretend that a revelation is immediately made of the proper remedy."

In 1840 I travelled on the upper Mississippi to Fort Snelling, (a few miles above where St. Pauls, Minnesota, now stands,) and obtained considerable information in regard to the peculiar customs of the Dacotah (Sioux) Indians. (This intelligence was acquired through the courtesy of the Rev. Samuel W. Pond, a Missionary under the A. B. C. F. M.; and its publication immediately followed the sketch of the Cherokees.) They have a secret association among them called "The Medicine Society," which furnishes to the tribe all their priests, magicians and medical practitioners. Each individual member possesses a triple character, all the elements of which are brought into requisition in the treatment of the sick. They administer secret remedies, but place their chief reliance on superstitious ceremonies.

An over estimate has been placed upon Indian skill in the treatment of disease. The time has been when almost any charlatan calling himself an "Indian Doctor" was looked upon as one possessing mysterious and extraordinary powers; and, at the present day, in some sections of country, the title exercises a potent influence.

But notwithstanding the ignorance of the primitive Indians in regard to pathology and therapeutics, they have in the lapse of time observed the favorable influence of certain substances in diseases of a strikingly uniform character, as well as the operation of particular plants on special physiological functions. Many of those plants, if rationally applied, may prove to be of great value; and I regret my inability at this time, to furnish a numerous catalogue. Since you called my attention to the subject, I have learned that a knowledge of a large number of Cherokee remedies could be obtained; but the process would involve an expenditure of more time, labor, and money than I can at this time incur. The botanical examination and analysis of the plants, would require no small amount of time and labor. I purpose, however, bestowing special attention to the subject.

The principal part of the Cherokee Nation lies between the parallels of latitude north 36° and 37°; and longitude west from Washington, 18° and 23°. It abounds in aromatic plants, belonging chiefly to the natural orders Umbelliferæ and Labratæ, many of which could, I doubt not, be profitably employed in various ways.

The facilities for exportation are good, as the river Arkansas pursues its tortuous way through a considerable portion of the Cherokee country.

MEDICINAL PLANTS OF THE CHEROKEES.

EMETICS.

Veronica Virginica. (Leptandra Virginica. Culver's physic. Known here under the name of black-root.) Natural order, Scrophulariacæ. This plant grows somewhat sparsely in this region, — the explorer often having to pass over considerable distances between groups. I have found several specimens with leaves in whorls of 3 leaves, the plant, in every other respect, agreeing with those having whorls of 4, 5, and 6.

According to the accounts I have received, the Veronica Virginica is potent both for good and for evil. When taken in large quantity, there can be no doubt of its exercising decided toxical effects; but I have not satisfactorily learned in what way it displays its poisonous properties. It is probable that it produces inflammation of the alimentary mucous membrane. Still this effect would not account for a *sudden death*. Some years ago, a half-breed Cherokee on Honey Creek, in Delaware District, being in the first stage of an apparently mild attack of fever, prevailed on a friend to procure him about a pound of the roots. This amount was boiled in a considerable quantity of water, strained, and evaporated to a pint. He made a single draught of it, and died in a few hours.

Many persons have extolled it to me as a febrifuge; particularly as a remedy in intermittent fever. When taken somewhat freely, it acts as an emeto-cathartic; in moderate quantity, in divided portions, at short intervals of time, as an emetic only. Sometimes the tumult (revulsion) consequent upon the action of a powerful emetic or nauseating cathartic will arrest an intermittent fever; and in this manner it is probable this medicine has acted favorably, and not from any purely anti-periodic property. It is sometimes taken in small quantity two or three times a day, and may, when thus exhibited, act favorably as alterative.

Gillenia Stipulacea. (Bowman's root.) Natural order, Rosaceæ. This plant is found in great abundance in this section of the country, and is a favorite emetic with the Cherokees. It is given in decoction.

Silphium Laciniatum. (Rosin Weed. Polar Plant. Known here by the name of Wax-weed.) Natural order, Compositæ. This conspicuous plant adorns the low, rich portions of the prairies, and simulates in its outline the wild sun-flower, from which, however, it differs materially in botanic characters. It is rich with a resinous substance. During the spring and early part of the summer, before a stem is developed, its broad, rough, deeply cleft, pinnate leaves, invariably range in position north and south, which circumstance, I presume, led to the name of Polar Plant. I had never, until recently, fixed upon its botanical rank; and had for many years called it *compass*-weed. On several occasions, when travelling over prairies or open wood-lands, without a road on cloudy days, it had subserved the purpose of a magnetic needle, and I was thereby enabled to pursue my way correctly.

The Indians scrape the roots and macerate the scrapings in tepid water. Of this infusion they drink a small quantity every quarter or half hour until vomiting is induced.

Eupatorium Perfoliatum. (Bone-set. Thoroughwort.) Natural order, Compositæ. This is used as an emetic, as well as for other purposes. By drinking plentifully of a decoction of the leaves and stems, copious vomiting is induced, sometimes followed by purging. At the same time a profuse perspiration attends its action. A powerful revulsion is thus brought about, and in many instances agues or remittent fevers may be aborted.

CATHARTICS.

All the plants enumerated under the foregoing heads of *emetics*, are used in most instances as emeto-cathartics. When a cathartic effect only is desired, the infusion or decoction is taken at long intervals, so as to avoid emesis.

Apocynum Cannabinum. (Indian Hemp. Also known here as *Silk-weed.*) Natural order, Apocynaceæ. It is found here in great abundance, in cultivated grounds, and in other situations.

I have known the root of this plant, (which, when dried, is easily pulverized,) used for its cathartic, alterative, and tonic effects; and I am inclined to think that it deserves the special attention of physicians.

Euonymus Americanus. (Arrow-wood. Burning-bush. Wahoo.) Natural order, Celestraceæ. The bark of the root, (which is very pulverable,) is used as a cathartic, diuretic, alterative, and tonic. It grows in Canada, and in several of the (perhaps all) States of the Union. I have seen it in East Tennessee, Missouri, Arkansas, and in this section. It is generally found on the margins of water-courses.

Many years ago, in Tennessee, I employed it apparently with good effect, as a cathartic. It had the reputation among the non-professional, of exciting the hepatic secretion as forcibly as the mild chloride of mercury.

I once took about 20 grains of the pulverized bark of the root, and the popular impression seemed to be verified.

Cassia Marilandica. (American Senna.) Natural order, Leguminosæ. It grows in all the States of the Union, and is found plentifully in this region.

The Indians use the leaves in decoction.

DIURETICS.

Frost Weed. Ice Plant.—This is a flowering herb, but is not yet in bloom, and I cannot, therefore, determine its botanical position. The stem is erect, 4 winged, pubescent, branching irregularly, the branches ascending, *leaves* pubescent, feathernet-veined, ovate, lanceolate, accuminate, and remotely serrate, with long-winged petioles.

The frost-weed, or rock rose of the books, (Heliantherum Canadense,) is doubtless named from a white pubescence, or some other natural feature giving out the appearance of frost; but the Cherokee frost-weed, or ice-plant, is named from the circumstance of real frost, or porous ice, appearing around the base and a few inches up the stem, at an early date in Autumn, (the commencement of frosty nights.) There seems to be a profuse watery exudation from that part of the plant which readily freezes.

This herb is used as a diuretic, in derangements of the urinary organs, but it is more frequently resorted to in uterine affections, and will be hereafter noticed.

Rhus Glabra.— (Sumac.) Natural order Anacardiaceæ. The root of this plant, (which grows in the greatest profusion in this region of country,) is used as a diuretic.

Asclepias Tuberosa.— (Pleurisy root. Butterfly-weed.) Natural order Asclepeadaceæ. It grows plentifully in this section. The root is used extensively by the Indians, as a remedy in gonorrhœa, and is highly extolled.

Hydrangea Arborescens. — (Seven-barks.) Natural order, Saxifragaceæ. This plant grows in the Middle and Western States, and is found here plentifully.

The Indians suppose it to be eminently antitithic, and use it in what the non-professional term *gravel*, which comprehends the affections of the kidneys and bladder. A discharge of numerous venal calculi is said to follow its use, in all cases where they exist. The Indians know nothing in regard to the *modus operandi* of medicines. When a disease subsides under the use of a certain plant, they look no further. If the hydrangea arborescens acts as an antitithic, it doubtless does so through its diuretic property.

The late Dr. Elizur Butler called my attention to it some years ago. He published a statement in regard to it, whilst acting as a missionary under the A. B. C. F. M., in the New Jersey Medical Reporter.

Euonymus Americanus. — (See cathartics.) This is resorted to by the Indians as a diuretic.

More than ten years ago, in Tennessee, a gentleman sent for me for an affection of the kidneys which had commenced on the afternoon of the previous day. Exceedingly copious discharges of urine constituted the leading feature of the disease, with some disturbance of the bowels. On questioning him, I found that a few hours before the inception of the disease, he had drank somewhat plentifully of a decoction of Wahoo, having been told by a neighbor that it was an excellent mild tonic. A good dose of opium and camphor (principally) allayed the disease.

Gravel-weed. — This is a flowering herb, and has not yet blossomed; and I cannot, therefore, analyze it. The *stem* is tall, erect; *leaves* entire, alternate, lanceolate, serrate and multitudinous. I am informed the corolla is yellow.

This plant seems to be held in as high estimation as the foregoing.

Verbena Urticæfolia. — (Nettle-leaved vervain. Corrupted here into *burvine.*) Natural order, Verbenaceæ.

This is esteemed a mild diuretic; and it is also supposed to possess emmenagogue properties.

DIAPHORETICS.

All the emeto-cathartic plants enumerated under the heads of emetics and cathartics, are used as nauseants and diaphoretics.

Asclepias Tuberosa. — (See diuretics.) As a sweating agent, it is used in the form of warm decoction.

Many persons here chew a small quantity of the root daily, during the hot months, as a prophylactic against periodic fevers; and also as a remedy for indigestion, and other gastric disturbances.

Sweat-weed. — This is likewise a flowering herb, which is not yet in bloom; and I cannot, therefore, arrange it botanically. It is declared to be a powerful sudorific, and is said to act without producing any gastric disturbance. It is a handsome and somewhat singular plant, the internodes being alternately pubescent and smooth; at least having that appearance at the distance of a few yards.

The late Rev. Young Wolf, a native Methodist preacher, placed great confidence in its virtues; and Mrs. Reese (his daughter) who is an estimable lady, has recently informed me that he declared it to be a powerful sudorific; that to excite sweating it was only necessary to chew and swallow a moderate quantity of the fresh leaves.

EXPECTORANTS.

Valeriana Penciflora. — (American Valerian.) An herb which has acquired the name of valerian, is the only plant which has yet been pointed out to me as a Cherokee expectorant, except the asclepias tuberosa, (which has already been referred to.) I cannot conveniently obtain a specimen with the stem and flower; (the leaves are radical,) but from a specimen I saw some weeks ago, I suppose it to be the plant above named. Natural order, Valerianaceæ.

ANTHELMINTICS.

Chenopodium Anthelminticum. — (Jerusalem Oak.) Natural order, Chenapodiaceæ.

I do not know of any other plant which is used by the Indians as an anthelmintic.

NARCOTICS.

None with which I am acquainted.

STIMULANTS.

I am not acquainted with any plant which is used as a stimulant; neither do I know that the Indians resort to the use of any with a view to direct stimulation.

TONICS.

Cornus Florida. — (Dog-wood.) Natural order, Cornaceæ.

Cerasus Serotina. — Black or wild cherry. Sometimes spoken of in medical writings, under the name of Prunus Virginiana.) Natural order, Rosaceæ.

The barks of the above tree and arboreous plant, are resorted to by the Indians for their tonic properties.

ASTRINGENTS.

Hypericum Corymbosum.— (Spotted St. John's-wort. Known here as flux-weed.) Natural order, Hypericaceæ.

In diarrhœa and dysentery, (particularly in the latter disease,) a decoction of the plant is greatly extolled, both by common Indians and more intelligent persons. When the leaves are chewed for a few moments, they impart to the saliva a dark red color, causing it to present somewhat the appearance of the brick-dust sputa of pneumonia, and the muco-sanguinious discharges of dysentery; and in showing the plant the inhabitants exhibit that property of it by chewing a few of the leaves and spitting in the palm of the hand. Perhaps the apparent identity of the substances suggested its therapeutic application to the Indians, who paint their ball-sticks with the juice, obtained by chewing.

It is a handsome plant, and had a mild astringent and not disagreeable taste.

1. *Ulmus Americana.*

2. *Ulmus Racemosa.* — (1. White elm; or, as it is known here, and in Tennessee, *Red elm.* 2. Cork elm; and known here as *small elm.*) Natural order, Ulmaceæ.

A decoction of the bark is used in sanguinious, or sanguinalent, profluvias.

Persica Punctatum. — (Hydropiper. Smart-weed.) Natural order, Polygonaceæ.

This plant is used in dysenteric affections.

ANTISPASMODICS.

I have not learned that the Indians use any plant as an anti-spasmodic.

To the foregoing medicinal classes I will add: —

EMMENAGOGUES AND PARTURIEFACIENTS.

The Indians employ a vast number of plants, (as I have been credibly informed,) in the treatment of derangements of the uterine function; but I have not yet had an opportunity of becoming acquainted with many of them. I will glance at the few which have been pointed out to me. There can be no doubt of their possessing a knowledge of plants having emmenagogue properties in an exalted degree, which act as parturiefacients, as it is *well known* that abortion is often brought about by their use; and further, that they sometimes resort to measures which abolish the fecundating function of females. Many women have thus been rendered permanently sterile. Those thus treated have bad general health until after the lapse of the natural period for the cessation of the catamenia. Of the plants used for such purposes, I am unacquainted; but I am inclined to think that it would not be very difficult to acquire a knowledge of them.

Frost-Weed or *Ice-Plant.*— This has already been referred to, (see diuretics,) and partially described. It is used extensively in menorrhagias, and other menstrual irregularities.

The *verbena urticæfolia*, (see diuretics,) is highly esteemed as a remedy in *leucorrhœ.*

For *prolapsus uteri*, a decoction made of the mingled roots of the following plants, is used, both internally and externally, with great confidence in its efficacy.

Euonymus Americanus. — (Wahoo.)

Pantago Major. — (Green, or common plantain. Rib-wort.) Natural order, Plantaginaceæ. Apocynum Cannabinum. (Indian Hemp.) Eryngium Aquaticum. (Button snake-root.) Natural order, Umbelliferæ.

Chenopodium Anthelminticum—(see anthelmintics)—is used in painful and profuse menstruation, but is chiefly resorted to by women verging upon the "grand climateric"—"turn of life." The method of exhibition is simply to take a pint of the tea the day before the menstrual flux is expected to set in. This procedure is repeated for several months in succession. The Indian women aver that in this way the menses are caused to diminish in quantity, gradually, until they entirely cease; and, that painful menstruation, and the general bad health often experienced by females at that period of life, are fully obviated by this simple procedure. They also state, that such practice would be highly reprehensible in the case of young women, as the menstrual function would be thereby abolished, and consequent bad health entailed.

The ideas of the Indians, in regard to the powers of many medicinal plants, are often credulously extravagant, and cannot be relied upon; yet, (as already stated) they can, by the use of a plant or plants, induce permanent sterility; and, if the above account be true, we need not look further for an agent adapted to that purpose.

Lastly, the Indian Esculapiadæ have recourse to the use of a beautiful herb, (which I find belongs to the natural order Caryophyllaceæ, tribe Sileneæ, and is called by botanists *Silene Stellata*,) for the removal of a most painful (and often inveterate, though fashionable) mental disease known as *unrequited affection*, or *unreciprocated love*. It is a fact, certainly worthy of note, that a full-blooded Cherokee, or one brought up under the *ancient regime*, has never been known to commit suicide. Perhaps this modest, retiring little aborigne of secluded groves and lonely dells, with its regular whorls of four leaves and charming petals, (small, white, and delicately stellated,) may have heretofore exercised no small degree of influence, through the imagination or otherwise, in procuring this notable exemption from the crime of self-murder. Should it be introduced into fashionable circles, perhaps its virtues might be definitely determined.

It is very seriously asserted, that a tea made of the stems and leaves, will, when taken somewhat freely, from time to time, (as the effects of a previous draught seem to be subsiding,) bring about a total obliviousnes of the potent charms which cause so much suffering and confusion in the world. Were it consistent with botanical science, I would respectfully suggest a change in its name, so as to make it commemorative both of its implied virtues and of the Cherokees, and call it *Letheana Cherokeensis*.

Respectfully, your most obedient and humble servant,

J. P. EVANS.

CONSTITUTION

OF THE

AMERICAN PHARMACEUTICAL ASSOCIATION.

PREAMBLE.

Whereas, The advancement of pharmaceutical knowledge and the elevation of the professional character of Apothecaries and Druggists throughout the United States are dear to us in common with all well-disposed pharmaceutists; and *whereas*, a large portion of those in whose hands the practice of pharmacy now exists, are not properly qualified for the responsible offices it involves, chiefly by reason of the many difficulties that impede the acquirement of a correct knowledge of their business:

Therefore, We, the members of a Convention now met at Philadelphia, [September, 1852,] composed of Apothecaries and Druggists from different sections of the Union, and from all the Colleges and Societies therein existing, with the object of deliberating on the condition of our profession, do hereby resolve and constitute ourselves into a permanent Association, to meet annually, at such times and places as may hereafter be determined, for more effectually accomplishing the objects for which we are now assembled, and do now adopt the following

CONSTITUTION.

ARTICLE I.

This Association shall be called the American Pharmaceutical Association. Its aim shall be to unite the educated and reputable Pharmaceutists and Druggists of the United States in the following objects:

1st. To improve and regulate the drug market, by preventing the importation of inferior, adulterated or deteriorated drugs, and by detecting and exposing home adulteration.

2d. To establish the relations between Druggists, Pharmaceutists, Physicians, and the people at large, upon just principles, which shall promote the public welfare, and tend to mutual strength and advantage.

3d. To improve the science and the art of pharmacy by diffusing scientific knowledge among Apothecaries and Druggists, fostering pharmaceutical literature, developing talent, stimulating discovery and invention, and encouraging home production and manufacture in the several departments of the drug business.

4th. To regulate the system of apprenticeship and employment so as to prevent, as far as practicable, the evils flowing from deficient training in the responsible duties of preparing, dispensing and selling medicines.

5th. To suppress empyricism, and, as much as possible, to restrict the dispensing and sale of medicines to regularly educated Druggists and Apothecaries.

ARTICLE II. — *Of the Members.*

Section 1. Every Pharmaceutist or Druggist of good moral and professional standing, whether in business on his own account, retired from business, or employed by another, who, after duly considering the objects of the Association and the obligations of its Constitution, is willing to subscribe to them, is eligible to membership.

Section 2. The mode of admission to membership shall be as follows: — Any person eligible to membership may apply to any member of the Executive Committee, who shall report his application to the said Committee. If, after investigating his claims, they shall approve his election, they shall, at the earliest time practicable, report his name to the Association, and he may be elected by two-thirds of the members present, on ballot. Should an application occur in the recess, the members of the Committee may give their approval in writing, which, if unanimous, and endorsed by the President, shall constitute him a member, and the fact be reported to the Association at the next succeeding meeting.

Section 3. No person shall become a member of this Association until he shall have signed the Constitution, and paid his annual contribution for the current year. All persons who become members, shall be considered as permanent members, but may be expelled, for improper conduct, by a vote of two-thirds of the members present at any annual meeting.

Section 4. Every member shall pay into the hands of the Treasurer the sum of two dollars, as his yearly contribution, and is liable to lose his right of membership by neglecting to pay said contribution for three successive years. Members shall be entitled, on the payment of three dollars, to receive a certificate of membership, signed by the President, Vice-Presidents, and Secretary, covenanting to return the same to the proper officer on relinquishing their connection with the Association.

Section 5. Every local Pharmaceutical Association shall be entitled to five delegates in the annual meetings, who, if present, become members of the Association, on signing the Constitution, without being ballotted for.

Section 6. Pharmaceutists, Chemists, and other scientific men who may be thought worthy of the distinction, may be elected honorary members upon the same conditions and under the same rules as appertain to active members. They shall not, however, be required to contribute to the funds, nor shall they be eligible to hold office, or to vote at the meetings.

Section 7. Members who have paid their annual contributions for ten successive years shall be considered life members, and exempt from their yearly payments, and entitled to a certificate to that effect.

ARTICLE III. — *Of the Officers.*

Section 1. The officers shall be, a President, two or more Vice-Presidents, a Recording Secretary, a Corresponding Secretary, and a Treasurer, who shall be elected annually, and shall hold office until an election of successors.

Section 2. The President shall preside at the meetings, and administer the rules of order usual in deliberative assemblies. He shall nominate all special committees, except a majority of the members present direct a resort to ballotting, or other means.

He shall sign the certificates of membership, approve all foreign correspondence, and countersign orders on the Treasurer.

He shall present at each annual meeting a report of the operations of the Association during the year, with such information pertaining to its condition and prospects, and the object it has in view, together with such suggestions for its future management, as may seem to him proper.

Section 3. In case of the temporary absence or inability of the Pesident, his duties shall devolve on one of the Vice-Presidents, in the order of their names.

Section 4. The Recording Secretary shall keep fair and correct minutes of the proceedings of the meetings, and carefully preserve on file all reports, essays and papers of every description received by the Association, copies or abstracts of which shall be furnished for publication as may be required.

He shall furnish the chairman of every special committee with a list of its members, and a copy of the minute of its appointment, and shall notify every member of the time and place of each annual meeting. He shall be a member of the Executive Committee.

Section 5. The Corresponding Secretary shall conduct all correspondence directed by the Association, and reply to all communications addressed to it in its recess. He shall, from time to time, address local associations, members and others possessed of information likely to be of interest to the Association, and report such correspondence to the Committee on the Progress of Pharmacy, of which he shall be a member.

Section 6. The Treasurer shall collect and take charge of the funds of the Association, and shall also hold and issue the certificates of membership. He shall pay no monies, unless by the order of the chairman of one of the standing or of a special committee, authorized to appropriate funds of the Association, such order to be countersigned by the President.

He shall present a statement of his accounts at each annual meeting, that they may be audited. He shall also report to the Executive Committee, previous to each annual meeting, the names of such members as have failed to pay their annual contributions for three years, and also the names of such as have failed to return their certificates of membership after having been officially disconnected with the Association, and duly notified to do so.

ARTICLE IV. — *Of the Standing Committees.*

Section 1. There shall be two standing committees elected annually — an Executive Committee, and a Committee on the Progress of Pharmacy. They shall each consist of five members, and shall elect their own Chairman.

Section 2. The Executive Committee, of which the Recording Secretary shall be one of the members, shall have charge of the revision of the roll, the investigation of applications for membership, the election of members in the recess, and the publication of the Proceedings. They shall report at each meeting a revised roll of members, with appropriate notices of deceased members, also the names of any who, having become disconnected with the Association, refuse to return their certificates of membership, as provided by this Constitution.

The annual publication of the Proceedings shall contain the corrected roll of members, full minutes of the several sittings, the Reports of the President and of the Committees, together with such addresses, scientific papers, discussions, notices of new processes, and preparations, as the Executive Committee may deem worthy of insertion. At least one copy shall be furnished each member of the Association.

Section 3. The Committee on the Progress of Pharmacy, of which the Corresponding Secretary shall be one of the members, shall report annually to the Association on the improvements in Chemistry, Practical Pharmacy and the collateral branches, on any new works bearing on these subjects published in this country or in Europe, on the condition of the drug-market, and the quality of drugs and manufactured articles, whether of foreign or domestic production, found in commerce.

ARTICLE V. — *Of the Meetings.*

Section 1. The meetings shall be held annually, or as the Association may from time to time determine; provided that, in case of failure of this from any cause, the duty of calling the Association together shall devolve upon the President, or one of the Vice-Presidents, with the advice and consent of the Executive Committee.

Section 2. At the opening of each annual meeting, the President, or, in case of his absence, one of the Vice-Presidents, shall call the meeting to order, and preside until after an election of officers: In case the President and Vice-President are absent, this duty shall devolve on the chairman of the Executive Committee, or, in his absence, on any member chosen by vote of those present.

In the absence of the Recording Secretary, the President shall appoint a Secretary, pro tempore.

The order of business at the first session of each annual meeting shall be as follows:

1st. The appointment by the President of a committee of three persons to examine credentials, and report the names of those duly accredited.

2d. The Executive Committee shall report the names of new members, and of persons present, recommended for membership, who shall be immediately ballotted for.

3d. The roll of those in attendance, as thus completed, shall be called by the Secretary.

4th. The reports of the Standing and Special Committees shall be read by their titles, or in full, and laid on the table for future consideration.

5th. A committee to nominate officers for the ensuing year shall be appointed, consisting of one nominated by each delegation in attendance, and three members appointed by the President, from among those not delegated, to report at the opening of the next session.

The first session shall close with the reading of the President's annual report, and referring any portions requiring the action of Committees.

After the first session, the order of business shall be determined by the nature of the subjects presented, and by the consent of the majority.

Section 3. During periods fixed by vote for scientific discussion and the exhibition of specimens and processes, the ordinary rules of parliamentary bodies shall be suspended, but, at other times, shall be enforced by the presiding officer, from whose decisions, however, appeals may be taken if required by five members, and the meeting shall thereupon decide without debate.

A motion reduced to writing, and seconded, shall be open to discussion, and, while it is before the meeting, no motion shall be received, unless to amend, divide, commit, to lay on the table, postpone, or to adjourn; and a motion to adjourn shall be decided without debate.

On the call of any member, the yeas and nays shall be ordered, when every member shall vote, unless excused by a majority of those present, and the names and manner of voting shall be entered on the Minutes.

Article VI.

This Constitution may be altered or amended by a vote of three-fourths of the members present at any regular meeting, and notice to alter or amend the same shall be given at least one sitting before a vote thereupon.

Approving of the objects of the American Pharmaceutical Association, I am desirous of joining it in membership; and, having read its Constitution, I hereby signify my approval of it, and subscribe to it.

I hereby agree to return my certificate of membership in the American Pharmaceutical Association to the Treasurer of that body, If I shall hereafter cease to be connected in membership with it.

ROLL OF MEMBERS.

[Deceased Members in Italics.]

Henry T. Cummings,	Portland,	Maine,	1853
Edmund Dana, Jr.,	Portland,	Maine,	1859
Walter F. Phillips,	Portland,	Maine,	1859
William Atwood,	Portland,	Maine,	1859
N. S. Harlow,	Bangor,	Maine,	1859
John G. Cook,	Lewiston,	Maine,	1859
William Baker,	Brunswick,	Maine,	1859
Charles A. Tufts,	Dover,	New Hampshire,	1856
O. Gilman Dort,	Keene,	New Hampshire,	1858
Charles A. Merrill,	Exeter,	New Hampshire,	1858
George S. Kendrick,	Lebanon,	New Hampshire,	1858
Joseph H. Thacher,	Portsmouth,	New Hampshire,	1859
Edward H. Rollins,	Concord,	New Hampshire,	1859
John F. Rollins,	Concord,	New Hampshire,	1859
Julius Cone,	Concord,	New Hampshire,	1859
James Morgan,	Concord,	New Hampshire,	1859
George Moore,	Great Falls,	New Hampshire,	1859
Rufus W. Stevens,	Great Falls,	New Hampshire,	1859
S. P. Peck,	Bennington,	Vermont,	1853
J. C. Bingham,	St. Johnsbury,	Vermont,	1853
Chauncy L. Case,	Brandon,	Vermont,	1859
E. A. Morse,	Rutland,	Vermont,	1859
E. A. Pond,	Rutland,	Vermont,	1859
L. L. Dutcher,	St. Albans,	Vermont,	1859
Frederick Dutcher,	St. Albans,	Vermont,	1859
Samuel M. Colcord,	Boston,	Massachusetts,	1852
Samuel R. Philbrick,	Boston,	Massachusetts,	1852
Daniel Henchman,	Boston,	Massachusetts,	1853
Thomas Restieaux,	Boston,	Massachusetts,	1853
Andrew Geyer,	Boston,	Massachusetts,	1853
T. Larkin Turner,	Boston,	Massachusetts,	1853
Henry W. Lincoln,	Boston,	Massachusetts,	1853
William A. Brewer,	Boston,	Massachusetts,	1853

Thomas Hollis,	Boston,	Massachusetts,	1853
Ashel Boyden,	Boston,	Massachusetts,	1853
Henry D. Fowle,	Boston,	Massachusetts,	1853
James S. Melvin,	Boston,	Massachusetts,	1853
William W. Goodwin,	Boston,	Massachusetts,	1853
Charles T. Carney,	Boston,	Massachusetts,	1853
Robert R. Kent,	Boston,	Massachusetts,	1855
Alvah Littlefield,	Boston,	Massachusetts,	1856
Augustus P. Melzar,	Boston,	Massachusetts,	1856
Charles H. Atwood,	Boston,	Massachusetts,	1856
James Gordon,	Boston,	Massachusetts,	1857
Theodore Metcalf,	Boston,	Massachusetts,	1857
David Roberts,	Boston,	Massachusetts,	1858
William Brown,	Boston,	Massachusetts,	1858
Oliver H. Webber,	Boston,	Massachusetts,	1858
George D. Towne,	Boston,	Massachusetts,	1858
D. B. Kidder,	Boston,	Massachusetts,	1858
Andrew R. Fox,	Boston,	Massachusetts,	1858
Granville M. Clarke,	Boston,	Massachusetts,	1858
George D. Ricker,	Boston,	Massachusetts,	1858
C. H. Lyon, Jr.,	Boston,	Massachusetts,	1858
I. Bartlett Patten,	Boston,	Massachusetts,	1858
Leopold Babo,	Boston,	Massachusetts,	1859
John C. Howe,	Boston,	Massachusetts,	1859
Levi G. Dodge,	Boston,	Massachusetts,	1859
Franklin K. Phillips,	Boston,	Massachusetts,	1859
Andrew G. Weeks,	Boston,	Massachusetts,	1859
William J. Cutler,	Boston,	Massachusetts,	1859
E. Waldo Cutler,	Boston,	Massachusetts,	1859
B. F. Brown,	Boston,	Massachusetts,	1859
William D. Miller,	Boston,	Massachusetts,	1859
Theodore S. Harris,	Boston,	Massachusetts,	1859
George H. Chapman,	Boston,	Massachusetts,	1859
John French,	Boston,	Massachusetts,	1859
Theodore Wheeler,	Boston,	Massachusetts,	1859
Orlando Tompkins,	Boston,	Massachusetts,	1859
Isaac T. Campbell,	Boston,	Massachusetts,	1859
Thomas Doliber,	Boston,	Massachusetts,	1859
Charles Clarke,	Boston,	Massachusetts,	1859

John I. Brown,	Boston,	Massachusetts,	1859
Michael H. Gleeson,	Boston,	Massachusetts,	1859
James A. Gleeson,	Boston,	Massachusetts,	1859
Joseph T. Brown,	Boston,	Massachusetts,	1859
Moses D. Colby,	Boston,	Massachusetts,	1859
George Woodbridge,	Boston,	Massachusetts,	1859
Samuel H. Woods,	Boston,	Massachusetts,	1859
Henry Warren,	Boston,	Massachusetts,	1859
Abraham S. Wiley,	Cambridge,	Massachusetts,	1857
Henry Thayer,	Cambridge,	Massachusetts,	1858
William Gay,	Cambridge,	Massachusetts,	1858
A. R. Bailey,	Cambridge,	Massachusetts,	1859
A. H. Ramsey,	Cambridge,	Massachusetts,	1859
Joel S. Orne,	Cambridge,	Massachusetts,	1859
Francis D. Hardy, Jr.	Cambridge,	Massachusetts,	1859
David Scott,	Worcester,	Massachusetts,	1855
Nelson R. Scott,	Worcester,	Massachusetts,	1859
James L. Burbank,	Worcester,	Massachusetts,	1859
M. S. McConville,	Worcester,	Massachusetts,	1859
Anthony S. Jones,	Newburyport,	Massachusetts,	1858
Charles A. Nolcini,	Newburyport,	Massachusetts,	1858
Samuel A. Smith,	Newburyport,	Massachusetts,	1859
John Buck,	Chelsea,	Massachusetts,	1855
William T. S. Cardy,	Chelsea,	Massachusetts,	1859
Charles E. Field,	Chelsea,	Massachusetts,	1859
Edward G. Frothingham, Jr.,	Haverhill,	Massachusetts,	1859
George A. Kimball,	Haverhill,	Massachusetts,	1859
H. M. Whitney,	Lawrence,	Massachusetts,	1859
B. K. Bliss,	Springfield,	Massachusetts,	1859
Daniel F. White,	Charlestown,	Massachusetts,	1859
C. C. Bixby,	N. Bridgewater,	Massachusetts,	1859
Warren Tapley,	Lynn,	Massachusetts,	1859
Benjamin Proctor,	Lynn,	Massachusetts,	1859
Thomas A. Sweetser,	South Danvers,	Massachusetts,	1859
James Emerton,	Salem,	Massachusetts,	1859
John B. Arnold,	Fitchburgh,	Massachusetts,	1859
Francis O. Bigelow,	Medford,	Massachusetts,	1859
Samuel Kidder, Jr.,	Lowell,	Massachusetts,	1859
Dexter D. Geyer,	Gloucester,	Massachusetts,	1857

William H. Ware,	Gloucester,	Massachusetts,	1859
Eben Blatchford,	Rockport,	Massachusetts,	1857
B. W. Conant,	Woburn,	Massachusetts,	1858
Robert J. Taylor,	Newport,	Rhode Island,	1859
Albert L. Calder,	Providence,	Rhode Island,	1859
H. H. Burrington,	Providence,	Rhode Island,	1859
Alfred C. Dana,	Providence,	Rhode Island,	1859
Henry F. Fish,	Waterbury,	Connecticut,	1852
Nathan Dikeman,	Waterbury,	Connecticut,	1859
James M. B. McNary,	Hartford,	Connecticut,	1859
Samuel E. Noyes,	New Haven,	Connecticut,	1859
Llewellyn S. Haskell,	New York City,	New York,	1852
George D. Coggeshall,	New York City,	New York,	1852
John Meakim,	New York City,	New York,	1852
Eugene Dupuy,	New York City,	New York,	1852
C. B. Guthrie,	New York City,	New York,	1852
Junius Gridley,	New York City,	New York,	1853
James S. Aspinwall,	New York City,	New York,	1855
Benjamin Canavan,	New York City,	New York,	1855
John Canavan,	New York City,	New York,	1855
John Milhau,	New York City,	New York,	1855
John P. Dodge,	New York City,	New York,	1855
F. A. Hegeman,	New York City,	New York,	1855
James T. Maxwell,	New York City,	New York,	1855
Isaac Coddington,	New York City,	New York,	1855
Frederick Hale,	New York City,	New York,	1855
Fred. Thompson,	New York City,	New York,	1856
J. W. Bowers,	New York City,	New York,	1856
H. T. Kiersted,	New York City,	New York,	1856
William F. Henry,	New York City,	New York,	1856
George Syme,	New York City,	New York,	1857
Henry Haviland,	New York City,	New York,	1857
George W. Berrian,	New York City,	New York,	1857
George W. De la Vergne,	New York City,	New York,	1857
John Faber,	New York City,	New York,	1857
Alexander Cushman,	New York City,	New York,	1858
William J. Oliffe,	New York City,	New York,	1858
Thomas T. Green,	New York City,	New York,	1858
Ray B. Easterbrook,	New York City,	New York,	1858

Henry King,	New York City,	New York,	1858
William Egerton,	New York City,	New York,	1858
William M. Somerville,	New York City,	New York,	1858
Henry A. Cassebeer,	New York City,	New York,	1858
Edward L. Milhau,	New York City,	New York,	1858
George O. Bridges,	New York City,	New York,	1858
Lewis T. Lazell,	New York City,	New York,	1858
Edward H. Marsh,	New York City,	New York,	1858
John H. Currie,	New York City,	New York,	1858
Andrew J. Parker,	New York City,	New York,	1858
Samuel N. Stebbins,	New York City,	New York,	1858
Henry R. Haydock,	New York City,	New York,	1858
Lucian F. Wheeler,	New York City,	New York,	1858
John C. Hart,	New York City,	New York,	1858
Robert A. Sands,	New York City,	New York,	1858
William Hegeman,	New York City,	New York,	1858
Fred. V. Rushton,	New York City,	New York,	1858
John D. Dix,	New York City,	New York,	1858
William A. Gellatly,	New York City,	New York,	1858
J. H. Westerfield,	New York City,	New York,	1858
Walton S. Coon,	New York City,	New York,	1858
Augustus C. Evans,	New York City,	New York,	1858
Henry Kiersted,	New York City,	New York,	1858
Raymond Gravesend,	New York City,	New York,	1859
L. Leroy,	New York City,	New York,	1859
Henry Steele,	New York City,	New York,	1859
William Wright, Jr.,	New York City,	New York,	1859
James H. Anderson,	New York City,	New York,	1859
P. Wendover Bedford,	New York City,	New York,	1859
Alfred J. Shipley,	New York City,	New York,	1859
John W. Shedden,	New York City,	New York,	1859
W. Neergaard,	New York City,	New York,	1859
Henry Q. Mack,	New York City,	New York,	1859
F. F. Mayer,	New York City,	New York,	1859
Corydon E. Tyler,	New York City,	New York,	1859
Tristram W. Metcalf,	Brooklyn,	New York,	1857
Alexander Hudnut,	Brooklyn,	New York,	1857
Thomas Whitehorn,	Brooklyn,	New York,	1857
Edward R. Squibb,	Brooklyn,	New York,	1858

Robert J. Davies,	Brooklyn,	New York,	1858
George F. Ayling,	Brooklyn,	New York,	1848
George C. Close,	Brooklyn,	New York,	1858
J. Lindley Pyle,	Brooklyn,	New York,	1859
Cyrus Pyle,	Brooklyn,	New York,	1859
Luther Atwood,	Brooklyn,	New York,	1859
H. A. Tilden,	New Lebanon,	New York,	1858
A. I. Mathews,	Buffalo,	New York,	1855
William H. Peabody,	Buffalo,	New York,	1857
H. A. Blauw,	Rochester,	New York,	1856
Alfred S. Lane,	Rochester,	New York,	1857
James T. King,	Middletown,	New York,	1859
James Stratton,	Bordentown,	New Jersey,	1859
William Thomas,	Jersey City,	New Jersey,	1855
Peter V. Coppuck,	Mount Holly,	New Jersey,	1857
Charles Ellis,	Philadelphia,	Pennsylvania,	1852
William Proctor, Jr.,	Philadelphia,	Pennsylvania,	1852
Alfred B. Taylor,	Philadelphia,	Pennsylvania,	1852
Edward Parrish,	Philadelphia,	Pennsylvania,	1852
Peter J. Hazzard,	Philadelphia,	Pennsylvania,	1853
Samuel S. Garrigues, Ph. D.	Philadelphia,	Pennsylvania,	1855
Henry C. Blair,	Philadelphia,	Pennsylvania,	1856
John H. Eckly,	Philadelphia,	Pennsylvania,	1856
Frederick L. John,	Philadelphia,	Pennsylvania,	1856
John M. Maisch,	Philadelphia,	Pennsylvania,	1856
Thomas Weaver,	Philadelphia,	Pennsylvania,	1856
M. Henry Kollock,	Philadelphia,	Pennsylvania,	1856
Dillwyn Parrish,	Philadelphia,	Pennsylvania,	1857
Samuel T. Troth,	Philadelphia,	Pennsylvania,	1857
Ambrose Smith,	Philadelphia,	Pennsylvania,	1857
Thomas P. James,	Philadelphia,	Pennsylvania,	1857
Charles Bullock,	Philadelphia,	Pennsylvania,	1857
Thomas S. Weigand,	Philadelphia,	Pennsylvania,	1857
Samuel N. James,	Philadelphia,	Pennsylvania,	1857
Evan T. Ellis,	Philadelphia,	Pennsylvania,	1857
Lewis H. Emanuel,	Philadelphia,	Pennsylvania,	1857
Wilson H. Pile,	Philadelphia,	Pennsylvania,	1857
Samuel S. Bunting,	Philadelphia,	Pennsylvania,	1857
T. Morris Perot,	Philadelphia,	Pennsylvania,	1857

Asher S. Leidy,	Philadelphia,	Pennsylvania,	1857
William H. Pratt,	Philadelphia,	Pennsylvania,	1857
Edward Donnelly,	Philadelphia,	Pennsylvania,	1857
Henry Steiner,	Philadelphia,	Pennsylvania,	1857
Hennell Stevens,	Philadelphia,	Pennsylvania,	1857
Samuel Chapman,	Philadelphia,	Pennsylvania,	1857
Edward H. Hance,	Philadelphia,	Pennsylvania,	1857
Charles H. Eggert,	Philadelphia,	Pennsylvania,	1857
George M. Snowden,	Philadelphia,	Pennsylvania,	1857
George Cooke,	Philadelphia,	Pennsylvania,	1857
William R. Warner,	Philadelphia,	Pennsylvania,	1857
O. S. Hubbell,	Philadelphia,	Pennsylvania,	1857
Thomas Lancaster,	Philadelphia,	Pennsylvania,	1857
Thomas A. Lancaster,	Philadelphia,	Pennsylvania,	1859
Henry N. Rittenhouse,	Philadelphia,	Pennsylvania,	1857
J. Lindsey O'Neal,	Philadelphia,	Pennsylvania,	1858
William J. Jenks,	Philadelphia,	Pennsylvania,	1858
E. Raphael Perrot,	Philadelphia,	Pennsylvania,	1858
W. B. Thompson,	Philadelphia,	Pennsylvania,	1858
M. M. Selfridge,	Bethlehem,	Pennsylvania,	1858
Adolphus F. Neynaber,	Philadelphia,	Pennsylvania,	1859
Adam H. Wilson,	Philadelphia,	Pennsylvania,	1859
Benjamin F. Johnson,	Philadelphia,	Pennsylvania,	1859
Charles Bannvart,	Harrisburg,	Pennsylvaaia,	1856
William Heyser, Jr.,	Chambersburg,	Pennsylvania,	1856
William Loeffler,	Chambersburg,	Pennsylvania,	1857
Charles A. Heinitsch,	Lancaster,	Pennsylvania,	1857
Leander Neal,	Lancaster,	Pennsylvania,	1858
William M. Guilford,	Lebanon,	Pennsylvania,	1857
Joseph L. Leinberger,	Lebanon,	Pennsylvania,	1858
William L. McCorkle,	Colombia,	Pennsylvania,	1857
Samuel K. Norgrave,	Pittsburg,	Pennsylvania,	1857
George W. Weyman, Ph. D.	Pittsburg,	Pennsylvania,	1858
Charles H. Super,	Pittsburg,	Pennsylvania,	1858
Harmar D. Scully,	Pittsburg,	Pennsylvania,	1858
E. T. Miller,	York,	Pennsylvania,	1859
A. H. Grimshaw,	Wilmington,	Delaware,	1858
John P. Tower,	Wilmington,	Delaware,	1859
David Stewart,	Baltimore,	Maryland,	1852

George W. Andrews,	Baltimore,	Maryland,	1856
A. P. Sharp,	Baltimore,	Maryland,	1855
J. C. Rogers,	Baltimore,	Maryland,	1856
James M. Bowers,	Baltimore,	Maryland,	1856
Israel J. Grahame,	Baltimore,	Maryland,	1856
L. Phillips,	Baltimore,	Maryland,	1856
J. Jacob Smith,	Baltimore,	Maryland,	1856
Charles Caspari,	Baltimore,	Maryland,	1856
R. H. Dryden,	Baltimore,	Maryland,	1856
John W. Barry,	Baltimore,	Maryland,	1856
J. H. Lemmon,	Baltimore,	Maryland,	1856
Joseph Roberts,	Baltimore,	Maryland,	1856
E. J. F. Russell,	Baltimore,	Maryland,	1856
J. F. Moore,	Baltimore,	Maryland,	1856
Charles Wiseman,	Baltimore,	Maryland,	1856
George J. Fetter,	Baltimore,	Maryland,	1856
Edward C. Gilpin,	Baltimore,	Maryland,	1856
Oscar Monsarrat,	Baltimore,	Maryland,	1856
G. Davidge Woods,	Baltimore,	Maryland,	1856
J. B. Baxley,	Baltimore,	Maryland,	1856
Samuel McPherson,	Baltimore,	Maryland,	1856
James Balmer,	Baltimore,	Maryland,	1856
William R. Thompson,	Baltimore,	Maryland,	1856
William Caspari,	Baltimore,	Maryland,	1856
T. W. Tomlinson,	Baltimore,	Maryland,	1856
J. J. Thomsen,	Baltimore,	Maryland,	1856
Thomas H. Hilsby,	Baltimore,	Maryland,	1856
N. H. Jennings,	Baltimore,	Maryland,	1857
Elisha H. Perkins,	Baltimore,	Maryland,	1857
E. Kloman,	Baltimore,	Maryland,	1858
A. Vogeler,	Baltimore,	Maryland,	1858
Lewis Dean,	Baltimore,	Maryland,	1859
Valentine Harbaugh,	Washington,	Dist. of Columbia,	1856
H. H. McPherson,	Washington,	Dist. of Columbia,	1856
W. H. Gilman,	Washington,	Dist. of Columbia,	1856
J. B. Walsh,	Washington,	Dist. of Columbia,	1856
F. S. Walsh,	Washington,	Dist. of Columbia,	1856
D. S. Dyson,	Washington,	Dist. of Columbia,	1857
Samuel E. Tyson,	Washington,	Dist. of Columbia,	1857

Daniel B. Clarke,	Washington,	Dist. of Columbia,	1857
Hervey Herman,	Washington,	Dist. of Columbia,	1858
Edward Shoemaker,	Washington,	Dist. of Columbia,	1858
Joseph W. Nairn,	Washington,	Dist. of Columbia,	1858
T. C. McIntire,	Washington,	Dist. of Columbia,	1858
R. A. Payne,	Washington,	Dist. of Columbia,	1858
S. R. Sylvester,	Washington,	Dist. of Columbia,	1858
John L. Love,	Washington,	Dist. of Columbia,	1858
Joseph B. Moore,	Washington,	Dist. of Columbia,	1858
Cornelius Boyle,	Washington,	Dist. of Columbia,	1858
James N. Callan,	Washington,	Dist. of Columbia,	1857
S. B. Watie,	Washington,	Dist. of Columbia,	1858
Lewis M. Smith,	Washington,	Dist. of Columbia,	1858
Albert Palmer,	Washington,	Dist. of Columbia,	1858
John L. Kidwell,	Georgetown,	Dist. of Columbia,	1856
R. H. Stabler,	Alexandria,	Virginia,	1856
J. W. Bowling,	Alexandria,	Virginia,	1857
John A. Milburn,	Alexandria,	Virginia,	1858
Joseph Laidley,	Richmond,	Virginia,	1852
T. Roberts Baker,	Richmond,	Virginia,	1856
James Cooke,	Fredericksburg,	Virginia,	1856
Fayette W. Johnson,	Fredericksburg,	Virginia,	1858
Silas Whitehead,	Fredericksburg,	Virginia,	1856
Frederick M. Wells,	Charlotte,	Virginia,	1856
Charles K. Gallagher,	Washington,	North Carolina,	1857
Richard B. Saunders,	Chapel Hill,	North Carolina,	1858
J. Hartly Bunn,	Lynchburg,	North Carolina,	1859
John Thomson,	Sumpter,	South Carolina,	1858
H. J. Macdonald,	Barnwell, C. H.,	South Carolina,	1858
R. H. Land,	Newberry, C.H.,	South Carolina,	1859
Lewis T. Sillyman,	Colombia,	South Carolina,	1859
A. A. Solomons,	Savannah,	Georgia,	1858
W. W. Solomons,	Savannah,	Georgia,	1858
Robert Battey,	Rome,	Georgia,	1856
W. H. Warner,	Rome,	Georgia,	1859
J. B. W. Nowlin,	Rome,	Georgia,	1859
John M. Clark,	Milledgeville,	Georgia,	1857
Fleming G. Grieve,	Milledgeville,	Georgia,	1859
John S. Pemberton,	Columbus,	Georgia,	1857

J. A. Taylor,	Atlanta,	Georgia,	1859
W. A. Lansdell,	Atlanta,	Georgia,	1859
Robert J. Massey,	Atlanta,	Georgia,	1859
B. M. Smith,	Atlanta,	Georgia,	1859
J. Henry Zeilen,	Macon,	Georgia,	1859
Felix Glackmeyer,	Montgomery,	Alabama,	1856
P. C. Candidus,	Aberdeen,	Mississippi,	1857
Crawford Blackwood,	Columbus,	Mississippi,	1857
Matthew F. Ash,	Jackson,	Mississippi,	1856
A. E. Richards,	Plaquemine,	Louisiana,	1855
James A. Lee,	New Iberia,	Louisiana,	1856
William Longshaw, Jr.,	Bayou Sara,	Louisiana,	1858
John Baynon,	Shrevesport,	Louisiana,	1858
William B. Chapman,	Cincinnati,	Ohio,	1852
William S. Merrill,	Cincinnati,	Ohio,	1854
Edward S. Wayne,	Cincinnati,	Ohio,	1852
A. M. Stevens,	Cincinnati,	Ohio,	1854
W. G. M. Gordon,	Cincinnati,	Ohio,	1854
Lewis Rehfuss,	Cincinnati,	Ohio,	1854
J. V. Whetstone,	Cincinnati,	Ohio,	1854
J. W. Hannaford,	Cincinnati,	Ohio,	1854
J. C. Parr,	Cincinnati,	Ohio,	1856
Paul Reinlein,	Cincinnati,	Ohio,	1856
Oliver F. Gordon,	Cincinnati,	Ohio,	1857
Charles A. Junghanns,	Cincinnati,	Ohio,	1858
George A. Sheusler,	Cincinnati,	Ohio,	1858
W. F. Clency,	Cincinnati,	Ohio,	1859
J. H. Larwell,	Wooster,	Ohio,	1858
J. W. Deitrich,	Dayton,	Ohio,	1856
William Fiske,	Cleveland,	Ohio,	1857
J. F. Grossklaus,	Navarre,	Ohio,	1859
Frederick Stearns,	Detroit,	Michigan,	1855
T. R. Spence,	Detroit,	Michigan,	1857
Otto Leusner,	Detroit,	Michigan,	1857
Washington Laycock,	Detroit,	Michigan,	1857
Lewis E. Higby,	Detroit,	Michigan,	1858
Samuel B. Duffield,	Detroit,	Michigan,	1859
Robert F. Lattimer,	Jackson,	Michigan,	1857
John T. Fuller,	Ann Arbor,	Michigan,	1857

Uriah B. Wilson,	Ann Arbor,	Michigan,	1859
Thomas H. Barr,	Terra Haute,	Indiana,	1853
John A. Child,	Madison,	Indiana,	1856
B. F. Scribner,	New Albany,	Indiana,	1858
George W. Sloan,	Indianapolis,	Indiana,	1857
Charles Pefferman,	Peru,	Indiana,	1859
W. J. Luck,	Vincennes,	Indiana,	1859
Edward O. Gale,	Chicago,	Illinois,	1857
William H. Gale,	Chicago,	Illinois,	1857
James D. Paine,	Chicago,	Illinois,	1857
M. M. DeLevis,	Chicago,	Illinois,	1859
Guilford T. Chamberlain,	St. Louis,	Missouri,	1856
Eugene L. Massot,	St. Louis,	Missouri,	1857
James O'Gallagher,	St. Louis,	Missouri,	1858
J. Chadwick Moody,	St. Louis,	Missouri,	1858
Alexander Leitch,	St. Louis,	Missouri,	1858
Enno Sander,	St. Louis,	Missouri,	1858
W. H. Dornin,	St. Louis,	Missouri,	1858
Isaac E. Jones,	St. Louis,	Missouri,	1858
Samuel D. Hendel,	St. Louis,	Missouri,	1858
George M. Washburn,	St. Louis,	Missouri,	1859
H. A. Hughes,	Louisville,	Kentucky,	1857
J. T. Barrell,	Danville,	Kentucky,	1859
John Jackson,	Knoxville,	Tennessee,	1857
Samuel W. Osgood,	Davenport,	Iowa,	1858
C. F. G. Collins,	Beloit,	Wisconsin,	1859
Henry C. Morris,	St. Paul,	Minnesota,	1859
W. Sherman Potts,	St. Paul,	Minnesota,	1859
Charles L. Bache,	San Francisco,	California,	1852
William B. Little,	San Francisco,	California,	1857
Louis D. Lanszweert,	San Francisco,	California,	1859
Charles Hodge,	San Francisco,	California,	1859
George S. Dickey,	San Francisco,	California,	1859
George E. Hinckley,	San Francisco,	Calfornia,	1859
Charles P. Pollard,	Tysville,	California,	1859
Charles E. Hinckley,	San Francisco,	California,	1859
William K. Keith,	San Francisco,	California,	1859
James G. Steele,	San Francisco,	California,	1859
George C. Hunt, jr.	Frederickton,	New Brunswick, N.S.	1859

HONORARY MEMBERS.

Daniel B. Smith,	Philadelphia,	Pennsylvania,	1856
Thomas Farrington,	Boston,	Massachusetts,	1856
Madison J. Bailey, M. D.,	New York,	New York,	1856
George B. Wood, M. D.,	Philadelphia,	Pennsylvania,	1857
Franklin Bache, M. D.,	Philadelphia,	Pennsylvania,	1857
Elias Durand,	Philadelphia,	Pennsylvania,	1857

CORRESPONDENTS.

James Baker,	Wheeling,	Virginia.
Wm. L. Cleveland,	Charleston,	South Carolina.
J. H. M. Morris,	Louisville,	Kentucky.
J. H. Reed,	Chicago,	Illinois.
James B. Campbell,	Portsmouth,	Virginia.
B. R. Strong.	Knoxville,	Tennessee.
Morris Emanuel,	Vicksburg,	Mississippi.
George B. Gates,	Mobile,	Alabama.
L. Wilcox, Jr.,	Pittsburg,	Pennsylvania.
R. Browning,	Indianapolis,	Indiana.

SUSPENDED LIST.

			Contributions due from
William C. Arons,	Cincinnati,	Ohio,	1856 — 4 years
*William H. Adderly,	Cincinnati,	Ohio,	1854 — 6 years
W. H. Coolidge,	Cincinnati,	Ohio,	1855 — 5 years
Ashbury Kent,	Cincinnati,	Ohio,	1855 — 5 years
Theodore Marsh,	Cincinnati,	Ohio,	1855 — 5 years
Charles A. Smith,	Cincinnati,	Ohio,	1855 — 5 years
William R. Smith,	Cincinnati,	Ohio,	1855 — 5 years
John Scott,	Cincinnati,	Ohio,	1855 — 5 years
J. V. Whetstone,	Cincinnati,	Ohio,	1855 — 5 years
A. M. Stevens,	Cincinnati,	Ohio,	1856 — 4 years
Hamilton Creighton,	Cincinnati,	Ohio,	1855 — 5 years
S. M. Zachrisson,	Richmond,	Virginia,	1854 — 6 years
Alexander Duval,	Richmond,	Virginia,	1855 — 5 years
George L. Dearborn,	New Market,	New Hampshire,	1855 — 5 years
James B. Lane,	Fitchburg,	Massachusetts,	1854 — 6 years
Emery Souther,	Boston,	Massachusetts,	1855 — 5 years
John P. Dodge,	New York City,	New York,	1856 — 4 years
*Oliver Hull,	New York City,	New York,	1855 — 5 years
T. B. Merrick,	New York City,	New York,	1856 — 4 years
J. T. Maxwell,	New York City,	New York,	1856 — 4 years
*James M. Bowers,	Baltimore,	Maryland,	1856 — 4 years
David Stewart,	Baltimore,	Maryland,	1855 — 5 years

A. BOYDEN, Treasurer.

Oct. 19th, 1859.

Those marked "*," have never paid into the Treasury either admittance fee, or annual assessment.

1 gal
23-9+

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102 998 978